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Management Considerations
for
The Battalion Targeting
System Program

Lessons Learned from A Previous Effort

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Prepared for

BTS Program
Advanced Systems Concepts Office
U.S. Army Laboratory Command

by

Signal Tree Research, Inc.
14704 Pebblestone Drive
Silver Spring, MD 20905

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This study provides a review of efforts to integrate and demonstrate emerging technologies to satisfy new operational concepts. The focus of the study is on management considerations which facilitate or interfere with timely accomplishment of technology demonstrations

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Preface

The Department of Defense has been undertaking two endeavors, one of which is focused on improving the "system acquisition process" and the other which is focused on the exploitation of available technology for conventional warfare. The process improvement endeavor is a response to the Blue Ribbon Commission on Defense Management and the Nichols-Goldwater Act, both of which call for technology demonstrations in the system acquisition process. The endeavor to exploit technology for conventional warfare is known as the Balanced Technology Initiative (BTI), which is a Congressionally authorized and funded program managed within the Office of the Secretary of Defense.

The Battalion Targeting System (BTS) program has been part of the Balanced Technology Initiative and has within its scope technology integration and demonstration activities of the kind mandated in the Blue Ribbon Commission Report and the Nichols-Goldwater Act.

The goals of the BTI program and the concept of technology demonstration are not new, but are part of the continual evolution of the system acquisition process as well as the exploitation of available technologies for defense purposes. In the particular case of the BTS program, there are many similarities to an earlier Army effort which had as its goal the expeditious integration and demonstration of technologies in a way that would accelerate the system acquisition process.

This earlier Army effort, called the New Thrust Initiative, did not achieve all of its technology or managerial goals in the planned time frame. However some of the same technological components of the New Thrust Initiative have been subsumed in other endeavors and programs, one of which is the BTS effort.

This analysis started with a review and assessment of similarities and differences between the New Thrust Initiative and the BTI-BTS program with the goal of identifying factors that should be "managed" to assure successful completion of the BTS endeavor from a technical, operational and programmatic point of view.

The approach to conducting this analysis consisted of two activities performed simultaneously. One activity involved review and analysis of some of the records of the U.S. Army New Thrust Initiative. This activity involved records detailing much of the three year period of the New Thrust effort. The second activity involved meetings with BTS program personnel, review of TRADOC and JPOUAV program documentation, and attendance at a JPOUAV industry briefing. These latter activities taken together provided a review of both the managerial technical and doctrinal factors affecting the BTS program.

This report was drafted during the first quarter of FY91 and the bulk of information concerning the BTS program was obtained during that period. However,

the BTS program is an ongoing and evolving effort, and information describing the BTS program requirements, goals and organization has continually changed. Effort has been made during the review and final drafting process to incorporate as many of the changes in the BTS program situation as possible. Thus the cutoff date for information concerning the BTS program is essentially April '91.

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1. History and Description of Previous Effort

During the summer of 1981, the Army Science Board (ASB) considered the "Army of the 90's." The Equip Panel of the Army Science Board considered specifically the technologies which would likely make a significant difference in the warfighting capabilities of the Army during the 1990s and in the early 21st century. Based upon 1) a broad review of emerging and maturing technologies, 2) the threat as seen in the early 1980s, and 3) the evolving warfighting doctrine of the Army, the Equip Panel recommended that the Army exploit and concentrate its resources on a set of high leverage technologies.

In mid-December 1981, an *ad hoc* committee of ASB members and representatives from ODCSOPS and ODCSRDA* met to consider the recommendations of the ASB. The findings of this *ad hoc* committee were subsequently briefed to the Under Secretary of the Army. During the course of the briefing, the Under Secretary chose to concentrate the Army's R&D efforts on five "thrust" areas and directed that a plan be prepared to implement this decision.

"In the general discussion that preceded the specific prioritization items, there was agreement on the need to look at the Army as a system to better decide which programs should be given maximum emphasis. It was agreed that modeling analysis was not able at (the) time to do that and, therefore, the best move (was) to put emphasis on building and demonstrating what, in this case, the Summer Study felt, based on the latest input from the Army, were the highest leverage items to enhance the Army's combat capability."

The five technologies that were selected as having the highest priority were:

- *Very Intelligent Surveillance and Target Acquisition (VISTA)* - *technologies which allow the incorporation of enormous computational power and data processing capabilities into individual sensors and combination of sensors.*

Here the Under Secretary stressed the use of single platforms to carry multiple sensors and the associated capability to process the output of these sensors on board the platform before transmitting data to be fused with other ISTA sources.

- *Distributed Command, Control, Communications, and Intelligence (DC3I) - development of dispersed, survivable command and control nodes with application down to the small unit level.*

It was noted that there was a need to closely couple Distributed C3 with VISTA and although VISTA needed to be integrated with C3, it was felt each part was important enough to rate particular emphasis as a thrust area.

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*Acronyms are provided in Appendix A.

• *Self-contained Munitions* - the successors to the so-called "smart" munitions of today; munitions which require no external designation to destroy the target. (This general area was also known as "brilliant munitions.")

• *Biotechnology* - research and development efforts which emphasize the application of novel technologies, ranging from genetic engineering to the prevention and treatment of casualties on the integrated battlefield, to include development of vaccines, antidotes, and other treatment compounds.

• *Soldier-Machine Interface* - the transfer of operational burdens to the machine, and a reversal of the trend toward manpower intensive systems; exploitation of unique U.S. abilities and opportunities to interface with computers.

These five technology areas were called the New Thrusts, and the overall effort in the Army to accelerate research and development in these areas became known as the New Thrust Initiative.

With the approval of the five technology thrust areas and the Under Secretary's direction to prepare a plan of implementation, the Army Staff organized an Executive Committee and an Oversight Group. Members of the Executive Committee were general officer level persons from HQDA, TRADOC, AMC (then known as DARCOM) and the ASB. The Oversight Group was composed of action officers from the various ARSTAFF offices, namely ODCSRDA, OTSG, ODCSPER, OCE, and ODCSOPS. In addition "Thrust Area Working Panels" were established for each of the thrusts. These working panels consisted of representatives from appropriate Army labs, TRADOC and the Army Staff. Figures 1 and 2 depict the events and organization of the New Thrust Initiative during the 1981 and early 1982 time period.

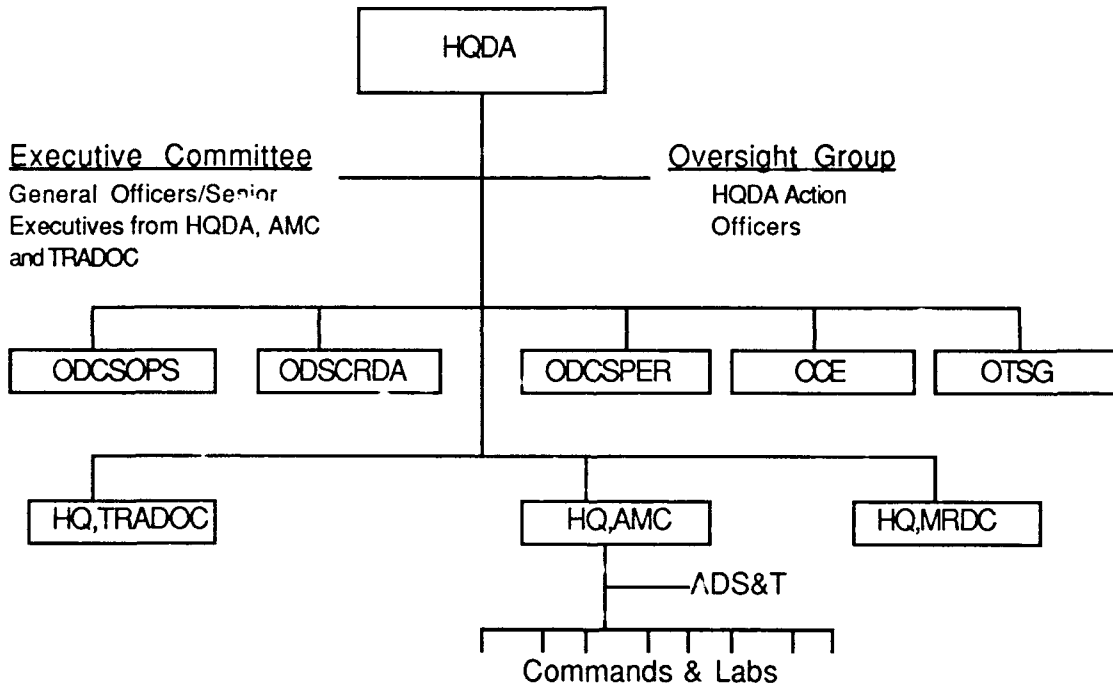The planning for implementation had specific objectives:

• the identification of specific projects within the thrust areas,

• the preparation of a five-year funding line beginning with FY84, and

• estimation of the time to transfer the effort to a 6.3B or 6.4 development program.

AMC was tasked to take the lead in integrating the five thrust area plans and in briefing the Executive Committee.

FIGURE 1. Early Event Chart

Summer '81	December '81	January '82	February '81	March '82
ASB Summer Study	• Ad Hoc Committee meeting on ASB Summer Study • Briefing by Ad Hoc Committee to USA • USA direction to focus R&D on 5 Thrust Areas	Establishment of Thrust Executive Committee & Oversight Group	Preparation of Thrust Area Plans by Working Area Panels	Briefing of Thrust Implementation Plans to USA

FIGURE 2. Early Organization For Planning

HQDA

Executive Committee
General Officers/Senior
Executives from HQDA, AMC
and TRADOC

Oversight Group
HQDA Action
Officers

ODCSOPS   ODSCRDA   ODCSPER   OCE   OTSG

HQ,TRADOC   HQ,AMC   HQ,MRDC

——ADS&T

Commands & Labs

Implementation Plans

The directive to prepare implementation plans required the preparation of funding plans that involved numerous program elements within the Army budget structure. Further it was understood that no "new" money was to be added to the Army budget to execute the New Thrust Initiative. Rather, the Army Secretariat indicated that funding of the five thrust areas was "to be done to a large degree by cutting back in (Army) basic research efforts in other areas." The Secretariat requested specific identification of which projects/programs were to be increased and which were to be decreased in the FY84-88 program to implement the New Thrust Initiative.

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With these instructions, working area panels were formed with personnel from the various commands, subcommands and agencies of the Army R&D community. Specific, though not detailed, goals were identified in each of the thrust technology areas and funding streams were developed. In most cases the project plans called for demonstration of a given capability by the end of the FY88 time period.

The implementation plans developed by the working area panels were briefed to the Army Under Secretary in early March 1982. In large measure the plans called for accelerating/resourcing efforts that were already underway within the Army's technology base program. As a result the existing program structure was used as the vehicle to absorb the additional funds being applied to the New Thrust technologies. [By using the existing program structure, there was no need to start the two year cycle generally required to get a new program in the DOD PPBES.]

During the course of the briefing of the New Thrust plans, the Under Secretary made several observations, among which were:

- *The plans indicated a series progression from 6.1 through 6.4, and that development and fielding took too long. It was suggested that steps, which could be eliminated or consolidated, should be identified and appropriate risks taken to shorten the overall process.*

- *The utilization of the Jet Propulsion Laboratory management team to assist in the New Thrust Initiative was appropriate.*

Focus on Demonstrations

With the directive by the Under Secretary to proceed with the implementation plans to include the increased funding of the Thrust areas during the '84-88 POM Period, in March of '82 the question arose as to how to track the execution of the New Thrust plans and ascertain that the New Thrust investment strategy was being implemented. Past experience had demonstrated that increased funding in tech base programs did not necessarily equate to accelerated development and fielding of a new technology. Since technology demonstrations were the principal planned result of most of the New Thrust implementation plans, it was proposed in HQ,AMC that the demonstration of a new technological capability should be planned for a given time frame in the future. With a definitive technical capability and a target date as an objective, financial and research resources could be focused on the demonstration of a capability. Thus defined and "scheduled" demonstrations become a management tool for defining, focusing and pacing the New Thrust efforts across AMC commands and laboratories. Specifically "scheduled" demonstrations were seen as:

- a management tool to identify "deliverables" from the tech base program;

- a means of communicating the utility of a new technology to non-technical personnel;

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• a way to verify the readiness of the technology for transition to system development programs;

• a stimulus for TRADOC concept development programs; and

• a basis for rationalizing the funding level for specific technology efforts within the tech base.

The New Thrust Initiative also had two other goals within its basic rationale. First there was the goal of treating the "Army as a system" and second, there was the goal of early fielding of the technology. These two additional goals impacted the New Thrust Initiative in different ways.

Integrated Demonstrations

Coincident with the idea of using demonstrations as a resource management tool, was the realization, that to satisfactorily demonstrate some of the new capabilities, which the New Thrust technologies offered, there would be a need to demonstrate several simultaneously. It was realized during the time of the formulation of the VISTA and DC3 technology thrusts that these two thrust areas were intimately connected in a real-time way. VISTA, as a military capability, needed a robust, distributed communications network if VISTA were to provide real-time data to a commander. It was further recognized that the use of self-contained munitions requires real-time information on "time sensitive" targets. There needed to be a real-time target data throughput from the VISTA sensor platform to the "self-contained munition" weapon system. It was evident that the full military potential of the Thrust technologies could not be demonstrated separately, but that there needed to be integrated and coordinated demonstrations of New Thrust technologies. In short, the tech base need d to demonstrate the "Army-as-a-system."

To wo, k toward the goal of the "Army as a system" an <u>integrated demonstration</u> was proposed, wherein those systems/technologies, which would need to work together in a military force, would be demonstrated together in the context of a military force structure. It became apparent that the real impact of the New Thrust technologies could not really be demonstrated unless the technologies were demonstrated in a way to show their synergy as well as interdependence.

To achieve demonstration of the New Thrust technologies in a synergistic way, a proposal was made to CG AMC and CG TRADOC to demonstrate selected New Thrust technologies in the context of a "brigade slice" of a division. The proposal was to create a demonstration situation which exercised the necessary parts of a brigade command and control structure so that the various New Thrust technologies could be applied and connected in an appropriate command and control architecture. This proposal, and its approval, required the coordination of the tech base programs in the various Army labs and centers.

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Financial Complications

It was also during the period of March and April '82, that the New Thrust financial support within the Army was put into jeopardy. Firstly, the Army received a reduction of $2.3 Billion in its Total Obligation Authority for 1984. This immediately put the increase in tech base funds, designated for the New Thrusts, in jeopardy. During this same period the Commander of the 9th Infantry Division of High Technology Light Division proposed that the New Thrust resources be applied to the HTLD experiments and equipping the HTLD. This action resulted in a confusion of a) who was responsible for managing New Thrust resources, b) whether the New Thrust funds were to be directed at the 9th ID's 1985 Flyaway target date, and c) what was to be the focus of the tactics and doctrine of the New Thrust efforts since the force structure and mission of the 9th ID was far removed from Airland Battle 2000 concepts. It was also during this period that some New Thrust project lines were placed in a program element identified with the HTLD, leading to further confusion in OSD and in the Congress.

User Involvement

The proposal to use 6.3A technology demonstration as a management tool for the New Thrust endeavor was accepted in HQ,AMC and HQ,DA. During the period June to September 1982, AMC Command and Laboratories, HQ,TRADOC, HQ,AMC and JPL worked to define a set of technical capabilities which could be demonstrated during the 1984-88 POM period. Because the demonstrations were to demonstrate both technical capability and military utility, the demonstrations needed user involvement for both concept development as well as assessment of demonstration results. This need for increased user (TRADOC) involvement led to the assignment of the mission of concept and doctrine integration to the TRADOC Combined Arms Center at Ft. Leavenworth. It was also during this period that a "Demonstration Working Group" was formed to define all the necessary interfaces and equipment needs attendant to a coordinated demonstration of New Thrust capabilities.

Concern For Analysis

The financial investment implied by the New Thrusts and their potential impact upon the course of weapon system development and acquisition, raised the question of whether the Army analysis community was suitably involved. Since the demonstrations were expected to produce data for making judgments about a given technology or operational concept, concern was raised about the design of the demonstration, the data to be collected and the use of the data. This concern led to consideration of ways to involve the three analytic agencies of the Army in the New Thrust planning efforts. Figure 3 shows the organizational relationship of these agencies to the rest of the New Thrust planners.

Figure 3. Analytic Agencies Involved in New Thrust Initiative
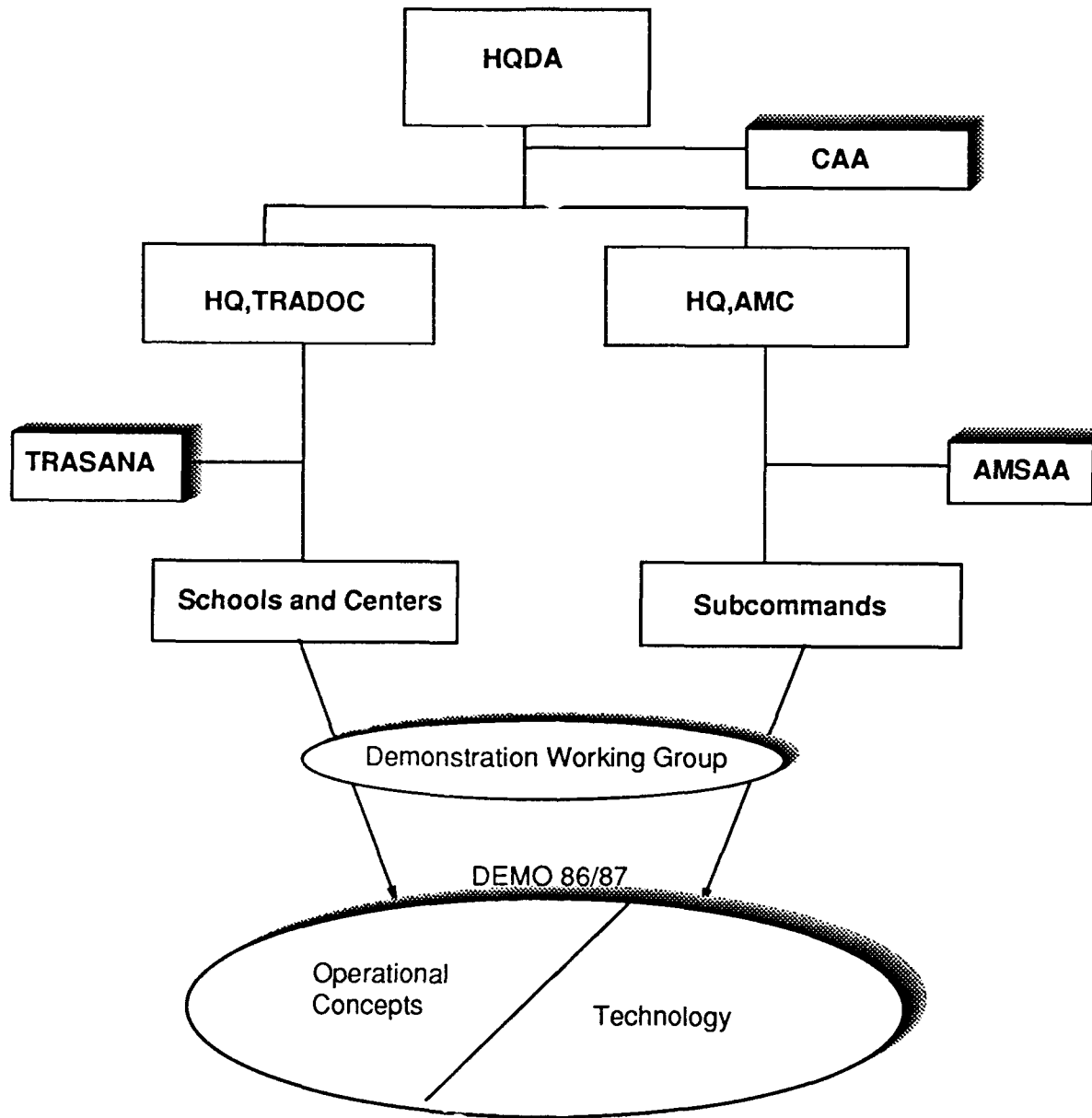
Demonstration Process

By the end of November 1982, the use of demonstrations was well received as a technique to establish the readiness of technology for transaction to full-scale development and as a means to experiment with new operational concepts of the user. Accordingly, attention turned to the demonstration "process" wherein new operational concepts and implementing technologies could be proven before, and as part of, the transition to full-scale development. In early December the model of periodic demonstrations was devised to allow "spin offs" on a regular basis into the fielded forces. See Figure 4 below. Demonstrations of operational concepts and technologies were proposed with the work at the HTDL being seen as an example of the first such transition demonstration, with subsequent demonstrations to be focused on later doctrinal developments like Airland Battle 2000. In essence this model proposed a new way of managing the tech base in the long term, and not just for the immediate New Thrust Initiative.

FIGURE 4. Conceptual Model of Using Demonstrations in Force Design and Modernization

Objective Force Structure Configurations
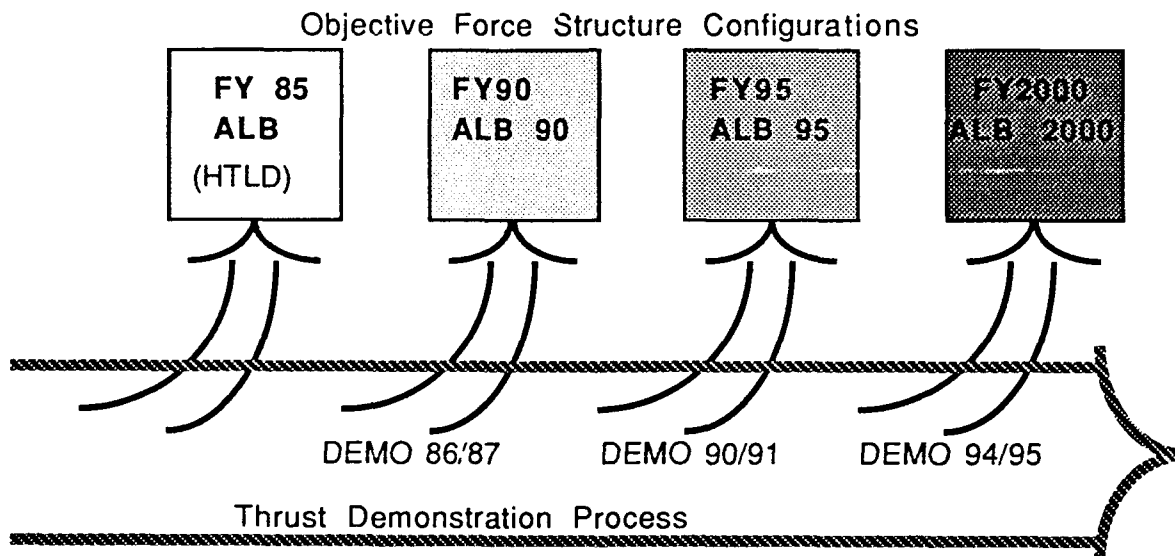
The proposal to use demonstrations as a management tool and as a means of transitioning technology to the fielded forces was presented to the Command Generals of AMC and TRADOC at their January '83 Quarterly Meeting. They approved the concept of "integrated demonstrations" and asked for further development of the concept of an '86/87 Demonstration.

Figure 5 below provides a summary of the principal events leading to the January 1983 decision to proceed with tech base demonstrations.

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FIGURE 5. Chart of New Thrust Events (1982)

March '82

- AMC proposal to focus on technology demonstrations as management tool
- Proposal to consider "Army-as-a-system in tech base
- JPL engaged by HQ,AMC for management support in Thrust areas
- 9th ID expresses interest in New Thrusts
- Army TOA reduced by $2.3B

April '82

- 9th ID proposes to integrate New Thrust resources into HTLD effort
- AMC tasked to review "unfundeds" resulting from TOA reduction

June '82 - Sept '82

- AMC directed subcommands to define New Thrust demonstrations for FY85-87 time frame
- AMC subcommands plan for integrated/coordinated thrust demonstrations
- New Thrust 6.3A efforts become "unfunded" issue in POM to budget process. Budgeteers question content and budget of thrust efforts
- TRADOC-CAC was assigned mission of concept and doctrine integration for '86/87 Demonstration
- "Demonstration Working Group" organized

Oct '82 - Nov '82

- Role for AMSAA in New Thrust proposal
- Role for CAA & TRASANA considered
- OSD guidance to keep thrusts in high priority despite funding difficulties
- AMC and TRADOC elements continue planning for demonstrations in 1986-87 time frame

Dec '82

- Demonstration/transition Model Proposed for accelerated fielding of New Thrust Technologies/Systems

Jan '83

- CG, AMC and CG, TRADOC jointly approved concept of "Integrated Demonstration"

Commanders' Guidance

The work of the Demonstration Working Group, in defining a demonstration process and the 1986-87 demonstration, proceeded during early and mid 1983. By October 1983, the demonstration process and an '86/87 demonstration were sufficiently well defined that a decision briefing (see Appendix B) was presented to the Commanders of AMC and TRADOC.

These two commanding generals jointly:

- *approved the "Demonstration Process";*

- *approved direction and content of '86/87 Demonstration';*

- *approved overall management approval and structure;*

- *disapproved direct interface with Forces Command;*

- *directed taking demonstration initiative to VCS to propose use of 9th ID as AMC/TRADOC Airland Battle 2000 test bed as logical long term use of ADEA;*

- *directed cost/schedule assessment of using 9th ID/Yakima as test bed versus other options;*

- *directed inclusion of logistics/supportability as part of demonstration program;*

- *directed avoidance of "warmed over" technologies and products; and*

- *directed aggressive effort to involve industry.*

Logistics and Industry

With these approvals and directives, the work of the Demonstration Working Group was defined for the rest of 1983 and most of 1984. Besides continuing work on the planning of the '86/87 Demonstration itself, the New Thrust management was turned to considering ways to actively involve the Army logistics community as well as industry. These latter two tasks were not easy because the Army logistics community in the past was never very involved in tech base programs, and the industrial community had little near-term opportunity to win contracts on yet-to-be-defined systems.

Nevertheless a vigorous program was put into action wherein the New Thrust Initiative and the demonstration process were the subjects of numerous speeches to industry by general officers of AMC and TRADOC. In addition, two briefing sessions for industry were held by the New Thrust management, in cooperation with and the support of the American Defense Preparedness Association (ADPA). One of these sessions was held on the West Coast, while the other was held in the Washington, DC area.

Figure 6 below illustrates the kind of involvement that various organizations had in the New Thrust Initiative by the Summer of 1984.

FIGURE 6. Army Agency Involvement In New Thrusts, 1984

AGENCY	SUBJECT AREA	POLICY	OBJECTIVES	RESOURCES	COMBT DEV	HDW/SW DEV	DEMO DESIGN	DEMO ONSITE	DEMO EVAL	6.4	PIP	ACQ
HQDA	OSA	X	X									
	ODCSOPS	X	X	X	X	X				X	X	X
	ODCSRDA	X	X	X						X	X	X
	ODCSPER	X	X	X								
	OCE	X	X	X								
	CAA						X		X			
AMC	HQ	X	X	X	X	X	X	X	X	X	X	X
	AMSAA						X		X			
	HEL						X	X	X			
	MSC'S			X	X	X	X	X	X	X	X	X
TRADOC	HQ	X	X	X	X		X			X	X	X
	CAC				X		X		X			
	SCHOOLS & CENTERS				X			X		X	X	
	T&E							X	X			
OCE	ALBE				X	X	X	X	X			
ARI	TRAINING				X	X	X	X	X			
	SKILLS ID				X		X		X			
FORSCOM	HQ	X		X	X							
	TROOPS	X		X				X				
	REAL ESTATE	X		X				X				
INDUSTRY						X		X		X	X	X

Change of Direction

Although the four-star commanders of AMC and TRADOC had given their approval and directed further prosecution of the New Thrust demonstration process and the '86/87 Demonstration, conditions and factors were changing which eventually

led to dissolution of the New Thrust Initiative by the beginning of 1985. In December of 1983 the AMC DCGRDA gave the following guidance:

"New thrust/demonstration implementation plan must reflect pertinent initiatives to insure:

(1) Effective program management;
(2) Guaranteed interaction with the (AMC) directorates;
(3) Effective organization and resource support;
(4) New Thrust efforts continue to be aimed at the theme of leap ahead rather than business-as-usual basis for systems development;
(5) The New Thrust effort is integrated with current (AMC)LD initiatives required to upgrade performance/support of the tech base/lab MSC system."

While this guidance reinforced the central purpose of the New Thrust Initiative. namely "leap ahead" in technologies applied to military systems, the guidance also burdened the New Thrust effort with all the bureaucracy and coordination processes attendant to full scale engineering and production programs. Further, the New Thrust Initiative was entangled in debates on the performance of the Army laboratory systems. These interfaces and issues were beyond the scope and authority of the New Thrust managers.
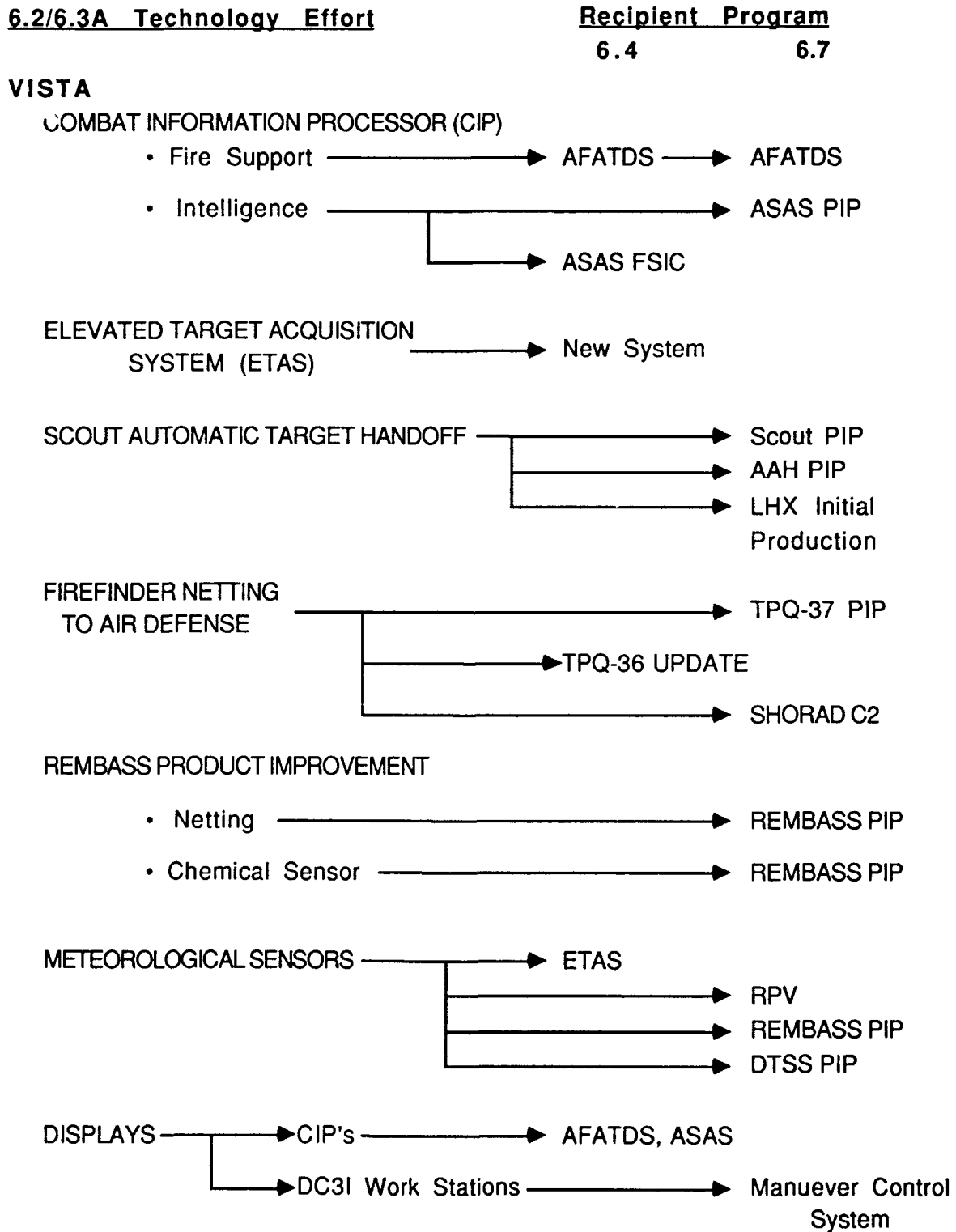
In response to the direction to evaluate the potential of using the 9th ID as a test bed for the New Thrust demonstrations, it was found that the 9th ID/ADEA had no equipment, facilities or instrumentation to carry out or support the needs of the '86/87 Demonstration. In fact, the 9th ID/ADEA was using the test planning and data collection capabilities of TRADOC to perform ADEA generated testing. Further it was found that the 9th ID had a commitment to be in a "go-to-war" status in FY86, and hence would not be available for force structure experiments in the '86/87 time frame. Nonetheless, the idea that the 9th ID/ADEA could be a suitable test bed for New Thrusts remained in the consciousness of some AMC general officers.

Burden of FSED/PIP Planning
In connection with the demonstration process as a technique to demonstrate "leap ahead" technology, there is the implication that there would exist 6.4 full-scale engineering development (FSED) or product improvement programs (PIPs) which would receive the "leap ahead" technology demonstrated in the technology base. During the spring and summer of 1984, the attention of the New Thrust organizaticn was turned away from planning and resourcing the '86/87 Demonstration to justifying specific "leap ahead" technologies in relation to potential or actual 6.4/PIP programs. Thus the New Thrust personnel were called upon to define and plan programs which were outside the scope and competence of the tech base, which needed well-established and DA approved requirements documents, and whicli involved and conflicted with some well-established program managers. In the fall of 1984 the New Thrust management was directed to "lay down" a complete flow of '86/87 Demonstration products into the funded FSED/PIP programs of the Army. Figure 7

below provides a summary of the anticipated flow of '86/87 Demonstration products into 6.4/6.7 programs. In effect, this new directive contravened the idea of "leap ahead" since it put New Thrust technologies, and associated new operational concepts, in lock step with the old way of doing Army development as well as the long drawn out FSED process.

FIGURE 7. New Thrust System Development
Flow Map

6.2/6.3A Technology Effort   Recipient Program
                                       6.4   6.7

VISTA

COMBAT INFORMATION PROCESSOR (CIP)

• Fire Support ──────────▶ AFATDS ──▶ AFATDS

• Intelligence ──────────────────────▶ ASAS PIP

                    └──────▶ ASAS FSIC

ELEVATED TARGET ACQUISITION
    SYSTEM (ETAS) ──────────▶ New System

SCOUT AUTOMATIC TARGET HANDOFF ──────────▶ Scout PIP
                              ──────────▶ AAH PIP
                              ──────────▶ LHX Initial
                                            Production

FIREFINDER NETTING
  TO AIR DEFENSE ──────────────────────▶ TPQ-37 PIP
                    ──────▶TPQ-36 UPDATE
                    ──────────────────▶ SHORAD C2

REMBASS PRODUCT IMPROVEMENT

• Netting ──────────────────────▶ REMBASS PIP

• Chemical Sensor ──────────────▶ REMBASS PIP

METEOROLOGICAL SENSORS ──────▶ ETAS
                          ──────────────▶ RPV
                          ──────────────▶ REMBASS PIP
                          ──────────────▶ DTSS PIP

DISPLAYS ──────▶CIP's ──────────▶ AFATDS, ASAS
          └──▶DC3I Work Stations ──────────▶ Manuever Control
                                                System

Figure 7. New Thrust System Development
Flow Map (continued)

6.2/6.3A Technology Effort   **Recipient Program**
                                          6.4   **6.7**

DC3I

- FIBER OPTIC LINK ─────────────▶

- PACKET RADIO ───────────────────────────▶ Production

- PACKET SWITCH OVERLAY ──────────────────▶ Multi-Channel
                                        └──────▶ MSE

- ARMOR/AIR COVERT NET ─────────────▶

- WORK STATIONS ──────────────────────────▶ TCT/TCT
                                               PIP
                        └──────────────────▶ MCS

- WORK STATION SOFTWARE ──────────────────▶ TCT/TCS/MCS
                                               PIP

- PACKET RADIO SINCGARS APPLIQUE ─────────▶ SINCGARS PIP

SCM

- FIBER OPTIC GUIDED MISSILE - FOG-M ───▶ New System

- 155 MM SADARM ───────────────────▶ New System

SMI

- Embedded Training ───── FOG-M ───────▶ New System

By the end of 1984, the AMC DCGRDA decided that an integrated and coordinated demonstration should not be done and that the various New Thrust technologies should be demonstrated on a piece-meal basis by individual laboratories and commands. This final turn of direction thus rescinded the previous decision of the CGs AMC and TRADOC, eliminated further consideration of the "Army-as-a-system," as recommended by the ASB, and removed any overarching rationale for preserving New Thrust funding in the technology base.

However the idea of demonstrating technology in the context of a field scenario did not lapse with the New Thrust Initiative. As noted in the Preface, Congress encouraged 6.3A demonstrations in the tech base and specifically directed DARPA not only to develop technology but to demonstrate its applicability. Technology demonstrations, now known as Advanced Technology Transition Demonstrations (ATTDs) now are a centerpiece in technology base program planning.

2. Competing Initiatives

The New Thrust Initiative was among many R&D efforts being undertaken by or managed by the Army. Several of these initiatives, because of their technology content or capability objectives, appeared similar to the New Thrust Initiative or laid claim to the same resources for execution.

All Source Analysis System (ASAS) - The ASAS program was (and is) a joint service program to develop the hardware and software to integrate, at the corps and division level, all available intelligence for operations planning. The Joint Tactical Fusion Program Office (JTFPO), which conducts the ASAS program, engaged the services of the Jet Propulsion Lab to serve as the system engineer for ASAS.

The function of ASAS at the corps and division level was generally the same as the VISTA effort which was focused on brigade and lower echelons. Both ASAS and VISTA had the technical goal of fusing intelligence information to provide the commander a (near) real-time intelligence picture. ASAS used (uses) national and theater level intelligence assets, whereas VISTA was being configured to use sensors and platforms under control of the brigade and lower echelons. ASAS focused its intelligence processing on the operational level whereas VISTA was focused on the real-time, tactical level of combat.

In the long term program plan of the ASAS program, the JTFPO projected a brigade level intelligence processing station whose characteristics sounded very similar to one of the products expected from the VISTA effort. This led to considerable concern about duplication of efforts, infringement upon a program manager's efforts, and necessitated numerous discussions and briefings within HQDA, OSD and the Congress. See also TIARA below.

High Technology Light Division (HTLD) - The HTLD effort had its origins in a directive by the Chief of Staff of the Army. The objective of the HTLD effort was to exploit available technology to field a division which had high mobility and fire power but which also could be airlifted in a 1000+ sorties of strategic lift aircraft. The CSA directed that the 9th Infantry Division at Fort Lewis, Washington become a "test bed" for trying out new equipments and new force structures which when adopted would result in a strategically deployable division with considerable combat power. The key for achieving this capability was to be the utilization of advanced technology systems, hence the identification as High Technology Light Division.

The 9th Infantry Division became the HTLD test bed and, independent of TRADOC and AMC, started to do doctrine and force development work as well as testing of equipment. These equipments were promoted principally by the defense industrial community.

The 9th Infantry Division mandate was to identify and acquire new technology systems, try them out, adapt them as appropriate and become a deployable division by

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1985 (later changed to 1986). Their goal of quick development and fielding was philosophically related to the Under Secretary's goal of accelerated development from the tech base through fielding.

Upon hearing about the New Thrust Initiative, the resources allocated, and the plans for 6.3A "demonstration" of New Thrust products, the Commander of the 9th Infantry Division proposed and the CSA "approved the integration of the New Thrust resources into the HTLD effort." This proposal of integrating New Thrust tech base resources into the HTLD effort raised several legal and procedural problems since a) the 9th Infantry Division was not chartered to spend R&D funds, b) the New Thrust efforts constituted the bulk of the Army laboratory program for several years, and c) the focus of the HTLD effort was far removed from the main threat addressed by the rest of the Army. With regard to this latter point, the rest of the Army was focused on upgrading the heavy forces deployed in Europe.

CECOM/DARPA DC3 Program - Prior to the New Thrust effort, the Communications Electronic Command (CECOM) and the Defense Advanced Research Projects Agency (DARPA) had initiated a joint effort to develop selected command, control and communications technologies that included many of the same technical capabilities of the DC3I portion of the New Thrust effort. The commonality of program content was not accidental. The planners of the New Thrust DC3I effort were essentially the same persons who executed the CECOM/DARPA effort and the synergism between the New Thrust and CECOM/DARPA was seen as being mutually beneficial.

With the New Thrust directive of the Army Secretariat, however, and inclusion of DC3I as an integral part of the New Thrust effort, management and oversight of the CECOM/DARPA effort at HQDA and HQ,AMC necessarily became more intense. The CECOM/DARPA effort was a jointly funded effort with the CECOM share coming from the same Army programs identified for the DC3I New Thrust initiative. Thus the DC3I part of the New Thrust was complicated by dual claims on the utilization of the same funds and by the need to more closely align the CECOM/DARPA program schedule and control with the New Thrust Initiative. The virtual autonomy of CECOM in dealing with DARPA was being challenged. This led to much obstinacy by CECOM and back channel messages, to AMC general officers and executives, challenging the New Thrust Initiative in general and the '86/87 Demonstration in particular.

Tactical Intelligence and Related Activities (TIARA) - Within the research, development and acquisition process of the Defense Department, intelligence systems have been treated quite differently from other systems. R&D programs that relate to intelligence systems have special review within the Army Staff, the OSD, and the Congressional staffs. The VISTA thrust became involved in the TIARA oversight process of ARSTAFF, OSD and Congress by virtue of the facts that the initiative 1) had "surveillance and target acquisition" in the title, 2) involved using the results of intelligence and electronic warfare (IEW) collections as part of the VISTA concept, and 3) involved using some IEW R&D programs and projects as the funding vehicle for

resourcing the necessary work. As a result of this entanglement of the tech base New Thrust efforts with the intelligence community apparatus, there were repetitive requirements to justify and explain the differences between VISTA and other intelligence programs, such as ASAS.

Full-Scale Development Programs - In almost all cases new technology and new systems concepts, researched and developed in the technology base, could eventually replace or otherwise improve a system under 6.4 full-scale engineering development. If a system is in 6.4 FSED, there are strong pressures within the overall R&D community -- TRADOC, PMs, contractors -- to minimize any "threat" to the 6.4 program. A tech base program could be a "threat" to a 6.4 program if decision makers within HQDA, OSD or Congress perceive (rightly or wrongly) that the tech base technology should be acquired vice the system in 6.4 FSED. Such perceptions often lead to redirection, stretch-out or killing of a 6.4 program -- an outcome that is to be assiduously avoided by a TRADOC proponent, PM, or contractor. The New Thrust Initiative had the potential for impacting many 6.4 programs. Thus there was a continuing need to articulate the differences between the New Thrust technology base programs and those that were in full-scale development. This need became acute when the 6.3A demonstrations of new systems concepts became a central objective of the New Thrust Initiative.

Funding Competition - Although the New Thrust technology initiative was directed by the Army Secretariat, it had to be competed in the budget process. As noted earlier, almost simultaneously with the briefing of the New Thrust area plans to the Army Secretariat in March '82, the Army received a $2.3 Billion reduction to the Army's RDA Total Obligation Authority. This budget action cut almost $50 million out of the programs structured to support the New Thrust Initiative. HQDA requested that each demonstration at the 6.3A level be reviewed and the funding be justified for each.

This financial directive had two effects. First the Army was again being looked at, not as a "system," but a collection of individual, isolated efforts. Secondly, evaluation criteria were applied to the technology base that are only properly applied to 6.4 and production programs. Thus there were expectations that the New Thrust demonstrations should be based on "requirements" documents or operational plans, some of which had not been written for an Airland Battle 2000 umbrella concept and which were to be part of the output from the demonstration process. Further, this review process was being conducted by financial managers, most of whom were not involved or briefed on the Army Secretariat's or commanding generals' guidance. Thus the review, prioritization, and budget cutting activity were done in the context of the old way of managing Tech base resources without an appreciation of the strategic change of direction that was being sought by the Army leadership.

3. Lesson Learned from Previous Efforts

Internal to AMC

While the New Thrust Initiative was enthusiastically endorsed and supported by the Commander of AMC, this support did not translate to commitment on the part of all who needed to be involved in executing the plan of action. While some persons within the HQ,AMC believed that a four-star headquarters could plan and execute a coordinated plan of action, others believed that HQ,AMC was merely an intermediary staff function between the AMC subcommands and HQDA. Thus within the HQ,AMC there was a mixed and widely varying level of interest or commitment to assuring that the New Thrust Initiative succeeded.

During the course of implementing the plan for an integrated demonstration, there were also several changes in the general officers at HQ,AMC. The Commander of AMC and the Deputy Commander for RDA -- who were originally involved with the ASB study, the formation of working area panel's with HQDA, and in working with Commander TRADOC -- retired and were replaced by general officers who had significantly different commitments and a significantly different perception of the HQ, AMC role in managing the technology base programs. As a consequence, the role of HQ,AMC in managing technology programs was redefined and the HQ,AMC New Thrust effort and organization was dissolved.

• The lesson to be learned from this HQ,AMC experience is that the organization, tasked to execute a demonstration type effort, needs a broad and continuing commitment from the higher headquarters. Further, the organization should be "recognized" within the community as having a charter to execute the assigned program. Without such a distinct charter, any PM, subcommand, or laboratory can assert an infringement upon their program or technological territory.

TRADOC Involvement

Early in the 1981 Summer Study work of the Army Science Board, the Board was briefed on the umbrella concept known as Airland Battle 2000. This doctrinal development, for use by Army planners, was being undertaken by the Army Training and Doctrine Command (TRADOC). Thus early in the New Thrust Initiative, TRADOC was a contributor and participant in the formulation of the concept of focusing on key technology thrusts.

Following the December, 1981 briefing to the Under Secretary on the ASB Summer Study, the Army staff sought full support of the doctrine and materiel development community. In January of 1982, the Army DCSRDA requested the involvement of the materiel development community. At the same time, the Army DCSOPS sought full support of TRADOC in the working panels and the oversight group in planning "specific programs responsive to the TRADOC concepts and the needs of the user."

This early involvement of TRADOC was principally through HQ, TRADOC and the DCS Combat Development there. At the working level, HQ, TRADOC had a full colonel and a major regularly participating in the overall thrust planning panels which also included HQ,DA and HQ,AMC staff officers.

During the first half of 1982, the majority of the planning efforts, relative to the New Thrusts, was in the hands of the materiel development community, principally AMC and its subcommands, and the ODCSRDA at HQ, DA. The work during this period focused on the replanning of FY83 programs and formulation of FY84 and out-year budgets to satisfy the directives of the Army Secretariat. TRADOC involvement was principally through participation in the budget review sessions and the annual "Summer Review" of the total AMC RDTE budget.

As a result of the HQ,AMC proposal to formulate specific New Thrust program objectives and to demonstrate new capabilities in the context of an integrated demonstration based upon new doctrinal developments, TRADOC as a whole became more fully involved. The integrated demonstration was to rely heavily upon the communications architecture and equipments which would characterize an Airland Battle 2000 type division. To provide the increased "user" involvement that was requested of TRADOC, and in recognition of the "combined arms" character of the New Thrust Initiative, HQ,TRADOC requested that the Combined Arms Center become directly involved in the New Thrust planning effort. By January, 1983 the C³ Directorate of CACDA was the principal TRADOC organization charged with bringing the TRADOC schools and centers fully into an integrated demonstration effort. In April, 1983 CAC held a planning session, involving the TRADOC schools and centers, specifically for the purpose of including their expertise in the New Thrust demonstration effort.

The output of the planning session was to have been "a coordinated position on the New Thrust Demonstration concept leading to information briefings" for the senior TRADOC and AMC leaders. However, the representatives of the schools and centers questioned the need and scope of an integrated demonstration, but agreed on further working group discussions and planning relative to a New Thrust Demonstration.

Although some TRADOC elements questioned the integrated demonstration concept, in the quarterly meeting of the Commanders of AMC and TRADOC, these two Commanders approved the integrated demonstration and the CG TRADOC directed that CAC proceed with concept development for the integrated demonstration to be held in the 1986/87 time frame. However by the end of October 1983, CAC had not organized a group of combat developers to carry out the necessary combat development needed in support of the demonstration of advanced new thrust technologies. (This lack of substantive input from TRADOC proved to be a continuing handicap in the New Thrust effort.)

From October '83 through the first half of 1984, CACDA played the dominant role in providing TRADOC input and involvement in the New Thrust Initiative. CACDA

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took the position that the New Thrust Demonstration was a "concept driven" effort and hence argued that the demonstration working group (DWG) should be chaired by CACDA. Such chairmanship would emphasize and implement their view that principal attention should be placed upon concept development as opposed to technology demonstration. A paper solution was obtained by splitting up the work into three sub-working groups so that the concept development work of CACDA was brought to the same level of visibility as the technology and systems development work.

However between October 1983 and July 1984, the Commander of TRADOC changed hands, and the new TRADOC Commander viewed the New Thrust Initiative as primarily a "hardware oriented" effort and "thus should be orchestrated by the DCSCD at HQ,TRADOC." He directed that involvement of TRADOC would be managed out of HQ,TRADOC and he relieved CACDA of New Thrust concept development and integration responsibilities.

In effect, the two year effort which started in the summer of 1982, to have a robust and integrated TRADOC concept development team for the Thrust demonstration process, was essentially scrapped by the summer of 1984. Efforts had to be renewed to involve TRADOC as a contributor to the New Thrust process.

• The lesson to be learned from this aspect of "user" involvement is that TRADOC is a multi-dimensional entity with schools and centers frequently taking contrary positions, often despite the guidance of two, three and four star generals. Further, it is to be realized that the uniformed personnel of TRADOC change quite frequently because of assignment rotations. It would be rare that any effort extending over more than two years will have continuity of participation by TRADOC officers. The likelihood is that there will be about a thirty percent turnover per year in the military personnel involved with a program. When there is a change over of both the action officer (typically a captain or a major) and a division chief (typically a full colonel) there will be a need to re-educate the "user" on the goals and details of a program. For a tech base program, lacking a definitive place in the acquisition strategy of a school, a serious shortfall in TRADOC support can be expected until the new crew is brought up to speed. Recognizing that a tech base program may be in competition with an already existing school (proponent) 6.4 program, one can expect that the tech base program will not get the user support required to keep the tech base effort on schedule and "defendable" against cuts at HQ,DA, OSD or the Congress.

Relationship with OSD
During the period of the New Thrust Initiative, within the OSD there were staff officers whose function was to integrate the technology base efforts across the three services. Each of these staff officers was responsible for a set of technologies and the related program elements and projects.

Each of the Army tech base projects, associated with or included in the New Thrust efforts, was monitored and managed by an OSD staff officer. Each of these staff

officers was responsible for overseeing progress and funding of programs in his area and is involved in the OSD budget action on each and every tech base program. After funds are appropriated by the Congress, each of these OSD staff officers is involved in releasing the funds to the services, and in specifying what is to be accomplished with the appropriated funds. Often an OSD staff officer took specific action to limit the use or reprogramming of funds in one of his projects. [This latter action was known as a "FORMAT I" designation. If a program is designated as FORMAT I, a service has to seek specific approval from OSD before funds can be reprogrammed.]

To prevent the "tinkering" on tech base programs by HQ,DA or HQ,AMC managers, OSD staff officers routinely designated their programs as FORMAT I, thus limiting or otherwise frustrating action at the intermediary headquarters. Sometimes it appeared that a FORMAT I was assigned after consultation with the subcommands and laboratories who executed the technology efforts. Since the personnel of the subcommands and laboratories had frequent and ready access to the various OSD staff officers, these personnel were able to easily and informally influence the designation of programs and projects as FORMAT I. If a subcommand or laboratory was adverse to what an intermediary headquarters wanted to do with appropriated funds, they could seek a Format I designation on their particular program. Some of the projects supporting the New Thrust Initiative had FORMAT I designations.

• The lesson here is that the informal network within DOD will likely prevail in the manipulation of program resources. If there is subcommand opposition to directions of intermediate HQs, like HQ,DA or HQ,AMC, considerable effort will be expended trying to break loose bottlenecks on the release of funding out of OSD. Clearly the preferred course for program funding is to have adequate dedicated funding to bypass the obstinacy of OSD action officers and subcommands. In effect there must be a means to buy the necessary services from other sources than the subcommands. (This is of course the kind of capability that chartered and funded program managers have at the 6.4/6.7 level.)

OSD Non-Involvement
The work of the Army Science Board, and the identification of the five technology thrust areas was done by the Army essentially without any involvement of OSD personnel. While the Defense Science Board had also arrived at conclusions similar to the ASB, no initiative was taken at the OSD level to prioritize specific programs and projects for accelerated development and demonstration. In effect the Army undertook to accelerate development and application of specific technologies without the active involvement of OSD. As a result there was no "god-father" within OSD for the Initiative, and at best only interested but non-involved action officers.

To have an initiative, such as the New Thrust Initiative, survive in the push and pull within OSD there needs to be "political" support at that level. While the Army Secretariat apparently informed the most senior leadership of OSD about the ASB study results, there evidently was no definitive political support within the OSD leadership for the Army's five thrusts and the implementation plans. Without specific

and obvious political support at OSD, initiatives such as the New Thrusts have great difficulty in surviving the OSD prioritization process. Survivability becomes very problematic in an era of budget cuts on major programs.

• All tech base programs of OSD go through POM - to - Budget review at OSD. If there is no one there who is informed and enthusiastic about an Army initiative the program is among the first targets in budget cutting drills.

Multiple Programs

The funding strategy for the New Thrust initiative was to use the program element and project structure that already existed. Each of the program elements -- IEW, communications, electronics devices, missile components, etc., -- had a different OSD staff officer as its monitor and manager. Consequently there were several staff officers at the OSD level whose support was needed to fund and defend the necessary program increases at the OSD level. Achieving increased funding was a particularly difficult task when programs had a "traditional" funding level over the years, and the OSD manager was ill-prepared to justify increases based upon any Army "New Thrust" initiative. This task became all the more difficult when budget cuts were mandated for the total tech base accounts. In times of budget cuts, the practice is to try and maintain the *status quo* and to postpone any new starts. In the minds of many, the New Thrust Initiative was a new start, instead of an acceleration of established technology programs.

There are two lessons that are implied by the above remarks:

• Since there will usually be an OSD staff officer who has responsibility for oversight and management of tech base programs, it is necessary to make sure such a staff officer is part of the "team."

• It is probably a mistake to attempt to fund a new initiative using many and varied program elements, especially if the projects have had their own funding "history" within OSD and Congress. Reprioritization and redistribution of funds among long established projects involves and impacts too many "interested" OSD staffers. To obtain their joint support requires briefing and convincing them and their superiors, which is another difficult bureaucratic endeavor.

Relations with Congressional Staff

It is no secret that Congressional staffers can and do influence the course and content of DoD appropriations and authorizations. To the extent that Congressional staffers are well informed about a given DoD program, one can expect positive Congressional support. Contrariwise, if the Congressional staff is poorly informed, one can expect negative reactions, if not opposition to a DoD initiative.

In recent years, especially when the Congress and the Executive are controlled by different political parties, one of the tasks of Congressional staffers seems to be to find places to cut the defense budget. New projects or programs, which have not been

briefed to Congressional staffers, and/or structured to satisfy staff concerns, will in all likelihood not survive a budget reprioritization and cutting process.

The New Thrust Initiative lacked Congressional support as a technology base initiative. While there has always been Congressional support for generic, level-of-effort technology base programs, the Congress was not informed about the specific nature or expected outcomes of the New Thrust demonstration efforts. As a result, there was little real staff support in Congress, and proposals for funding specific demonstration efforts were never really supported. Further, by the time budget proposals had been forwarded to the Congress, New Thrust demonstration projects had been rolled together with HTLD/ADEA programs, so that their separate identities were lost.

At the same time that Congressional staffers were relatively uninformed about the New Thrust Initiative, they were quite well informed about the Project Manager -- 6.4 -- programs. If choices arose for defending and funding programs, the better known 6.4 programs received support while the lesser known tech base efforts were cut or delayed.

Dialogue between Congressional and HQ,AMC personnel was (and perhaps still is) well controlled and impeded. It was considered the prerogative of HQ,DA to manage the departmental interaction with Congress and any proposal to discuss initiatives and plans with the Congress needed approval through a formal review process. There was little opportunity to build a working relationship and mutual confidence between technology base managers and Congressional staffers. As a result Congressional knowledge about the New Thrust Initiative was limited to what was on Congressional Descriptive Summaries or contained in Secretariat level testimony. Risks and benefits of the technology base efforts and comparison with other efforts was seldom included in the information provided the Congress.

Some lessons learned:

• There needs to be frequent, or at least in depth, dialogue with Congressional staffers to assure mutual understanding of the opportunities and risks of a program.

• There needs to be a definitive explanation of the differences between a technology base program and programs conducted by program managers.

• The tech base program manager needs to be able to articulate the fundamental (and worthwhile) differences between the various programs whether in the tech base, other services, or in full-scale development. There needs to be a systems analysis to establish these differences and to ascertain the payback of doing the tech base program.

• The tech base program manager needs authority to dialogue with Congressional staff without getting approval in each and every instance. [This

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authority should be analogous to that given PM's in their charter.]

Use of Technology Demonstration Results

In considering the desirability and/or need for a technology demonstration, decision must be made on what use will be made of the results of a particular demonstration. The New Thrust Initiative demonstrations, and the more general demonstration process, was originally conceived as a means of providing a deliberate pace and focus in the execution of technology base programs, particularly those programs in the 6.3A funding level.

While there was conceptual work, within the New Thrust effort, as to how the demonstration process could (and should) be used to accelerate fielding of new technologies, in 1984 this aspect of the New Thrust Initiative received unique and all consuming emphasis. Upon the change of command of AMC in June 1984, the whole RDTE community of AMC was focused on accelerated development and fielding of systems. (This effort also become known as "Accelerated Acquisition".) The desire to accelerate fielding of systems became more pervasive throughout the command echelons of AMC and TRADOC, and the highest levels of attention in these commands turned the New Thrust Initiative toward feeding technology into existing or contemplated full-scale engineering development (FSED) programs.

Although the desire to accelerate fielding of high leverage technologies was among the original goals of the New Thrust Initiative, there was never enough staff assigned to carry out such work. With the directive to consider transition planning, the small staff involved in the New Thrust effort was turned away from the planning of an integrated tech base demonstration to the justification of how and when a given technology effort would feed into a full-scale development program. The New Thrust staff was thus turned toward planning 6.4/6.7 programs, a function which was (and is) outside the purview of the tech base community and the function of another part of the HQ,AMC and DA bureaucracy. This redirection opened up again the issues of whether a Program Manager was interested in a new technology, whether the new technology would threaten an existing FSED program, and similar concerns which tend to have more political than technical content.

The period of time from June to November 1984 was spent preparing "lay downs" of funding streams and program lines to justify the planned activity in the tech base. Each of the technology demonstrations then became individually associated with a specific system development. The AMC DCGRDA requested that a "coordinated decision paper" be prepared by the tech base staff and the systems development staff of HQ,AMC. The purpose of the coordinated decision paper was to provide direction for the "further prosecution of the New Thrust Initiative." In effect the New Thrust effort was embedded in the old model of the Army as a collection of separately developed systems to be integrated upon fielding, versus the model of the "Army as a system" proposed and encouraged by the ASB, the Under Secretary, and the Commanders of AMC and TRADOC when the New Thrust effort was started. With

this turn of management direction, coupled to other factors, the New Thrust Initiative became disconnected and eventually dissolved.

• One lesson to be learned here is that the "advertised" purpose of a tech base demonstration can be used by some as a rationale to overload the demonstration team with more work than is possible to be accomplished by available staff and finances. Demonstrations in the tech base are programmatically and politically different from "demonstration/ validation" (DEM/VAL) activities in 6.3B or 6.4 programs. A 6.3B/6.4 program has obtained a credibility by virtue of its having gone through a requirements approval process, and with the assignment of a program manager and probably a PEO. Thus there are staff and finances to deal with the program planning issues that are inevitably raised by HQ,DA, OSD or the Congress. If a tech base demonstration is advertised as being a precursor to a 6.4 program, then the demonstration team needs to be resourced to work out all the transition issues (technical, schedule, financial and organizational) attendant to such a transition. Without resources applied to transition planning, the tech base demonstration rationale becomes gutted.

• Another lesson to be learned here is that the reasons for a tech base demonstration may become so varied and expansive that proponents and participants lose sight of the objectives. They then lose their enthusiasm or dedication to the effort. [This is especially true when the participants feel that they are being taxed to resource the demonstration.]

• A third lesson to be learned is that the time frame for accomplishing a demonstration (or any program) should be short enough that a good portion of the effort can be accomplished within the time that interested officers and executives are on-board. If, for instance, there is significant turnover in the general officer corps involved in the effort, it is likely that the effort will not survive.

• A final lesson here is that even though general officers and senior executives give their approval and encouragement for an initiative, there is little reason to depend upon it. Changing circumstances and outside pressures may eventually erode their support, especially if the general officer/senior executive has no personal stake in the program outcome. Unfortunately this tends to be the case with almost all tech base programs. [This is contrasted with 6.4 programs where PMs and PEOs often have a personal stake in program survival and success.]

Summary Assessment

The above analysis has treated various aspects of the New Thrust Initiative as being separate and disconnected. In reality the various aspects are entwined and tend to be synergistic. For instance, the lack of a robust and productive commitment by the TRADOC schools and centers could have been overcome either with consistent leadership from the commanders of TRADOC, and/or resources to fund contractual support for operational concept development. Lacking either, the personnel in the

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schools and centers could not devote the necessary time to produce the ideas and documentation that the "budgeteers" demanded.

With hindsight one can observe that no one difficulty was sufficient to cause delay and cancellation of the integrated demonstration effort. Rather the shortcomings in TRADOC support, lack of OSD support, confusion (or perhaps disinterest) in Congress, and antagonism of a subordinate command, all worked together to consume the time of the demonstration management team, so much so that the technical and programmatic aspects of the demonstration effort tended to be neglected. So much management time was spent "plugging holes in the dike" that a credible and useful integrated demonstration was not well defined and defended in sufficient time. This shortfall then became a new basis of criticism. (In this connection it is to be observed that opponents of a demonstration, whether at AMC, TRADOC, HQ,DA, OSD or the Congress, can raise so many issues that they want addressed, that the demonstration management is never able to satisfy all the demands for analysis, briefings and approvals.)

Demonstration managers must take steps to conduct a program "critical path/critical persons" analysis for continuing support and successful completion of a demonstration. The critical path to successful demonstration includes not only the resource decision makers but also persons they use for advice. In this category there may be Congressional staffers, former classmates, or co-workers any one of whom could be pivotal factor in program success.

A demonstration manager needs a set of critics who "murder board" the demonstration effort. Such a periodic review process should cover all program dimensions -- financial, technical, political, industrial, and personnel. Such "murder board" activity should be oriented at the future, that is, capable of anticipating emerging difficulties with a goal of minimizing and eliminating the most likely and critical program difficulties.

4. The BTI-BTS Program

The Balanced Technology Initiative (BTI)

The Balanced Technology Initiative had its origin in the Congress as a conventional weapon system program that complements the Strategic Defense Initiative (SDI). Similar to the SDI program, the BTI is managed by an OSD level director. Also similar to the SDI program, the BTI technical efforts are carried out by industry, and the labs and commands of the three services. In recent years (1989 and 1990) the BTI was funded by Congress at a level of approximately $210 Million per year. With the recent cutbacks in the defense budget, the BTI has undergone reductions in budget. These budget reductions necessarily have impacted upon the various subprograms which comprise the overall BTI program.

Battalion Targeting System (BTS) Program

One of the subprograms in the BTI has been the Battalion Targeting System demonstration. "The primary purpose of (the BTS) effort is to demonstrate a locally controlled surveillance system, for battalion commanders, to aid in weapon targeting capabilities, situation assessment, and operations planning." "It is anticipated that at the conclusion of this (demonstration) effort, a product will emerge that is capable of being transitioned to a 6.4 (Development Production Prove Out Phase) in FY94." (This implies that the items demonstrated embody technologies ready for production.)

The BTS program has been conducted as a joint US Army/US Marine Corps effort. The Army operational concept, applicable to the BTS development, is Airland Battle-Future, which is a further evolution of the earlier warfighting doctrines known as Airland Battle 2000 and Army 21.

The BTS program is divided into three phases:

1. Basic requirements assessment, initial concept definition, and survey of technologies.

2. Contractor concept definition studies, government design evaluations, common general equipment acquisition.

3. Acquisition, integration, and demonstration of BTS airborne component; fabrication and integration of BTS ground station components; government demonstration of integrated airborne and ground station components; development of technical data package and transition concept.

BTS Program Management

The BTS program is managed for the Director, BTI by the Advanced Systems Concept Office of the U.S. Army Laboratory Command. However, because the BTS program is expected to satisfy multiple interests, execution of the program is overseen by a "Management Council" composed of representatives from the various parts and echelons of the Army and Navy-Marine Corps development communities. Figure 8

below shows the "location" of the ASCO relative to the other principal government activities involved in the BTS effort. (It is to be observed that no one from HQ,AMC or HQ,LABCOM is part of the Management Council.)

BTS Administrative Support

The BTS program concept and plan requires considerable responsive support of a government contracting officer and related procurement and legal functions. For the BTS program this contracting support is provided by the LABCOM/HDL Directorate of Contracting, whose primary focus is the procurement actions needed in support of Army/LABCOM/HDL programs.

Figure 8. Principal Government Organizations
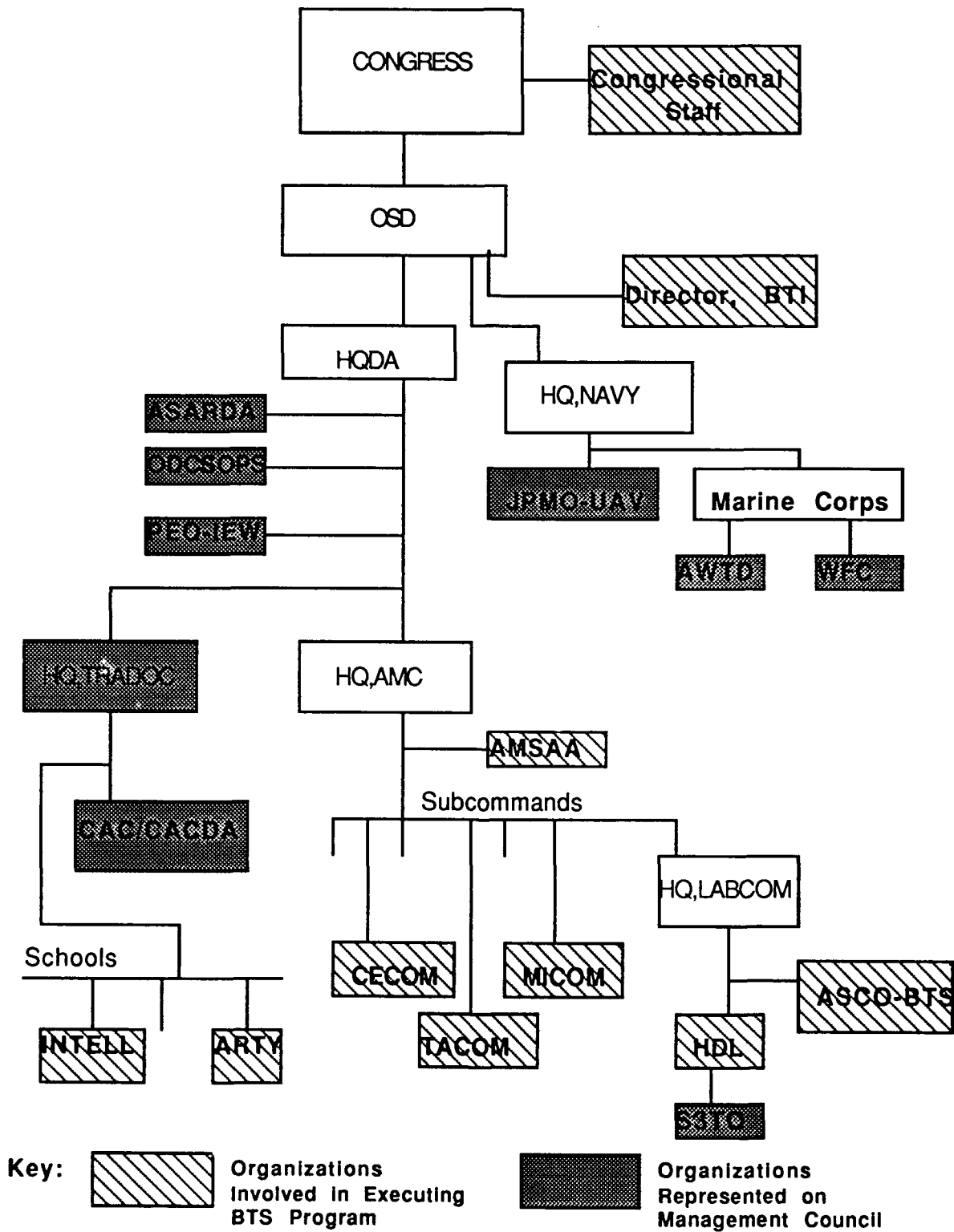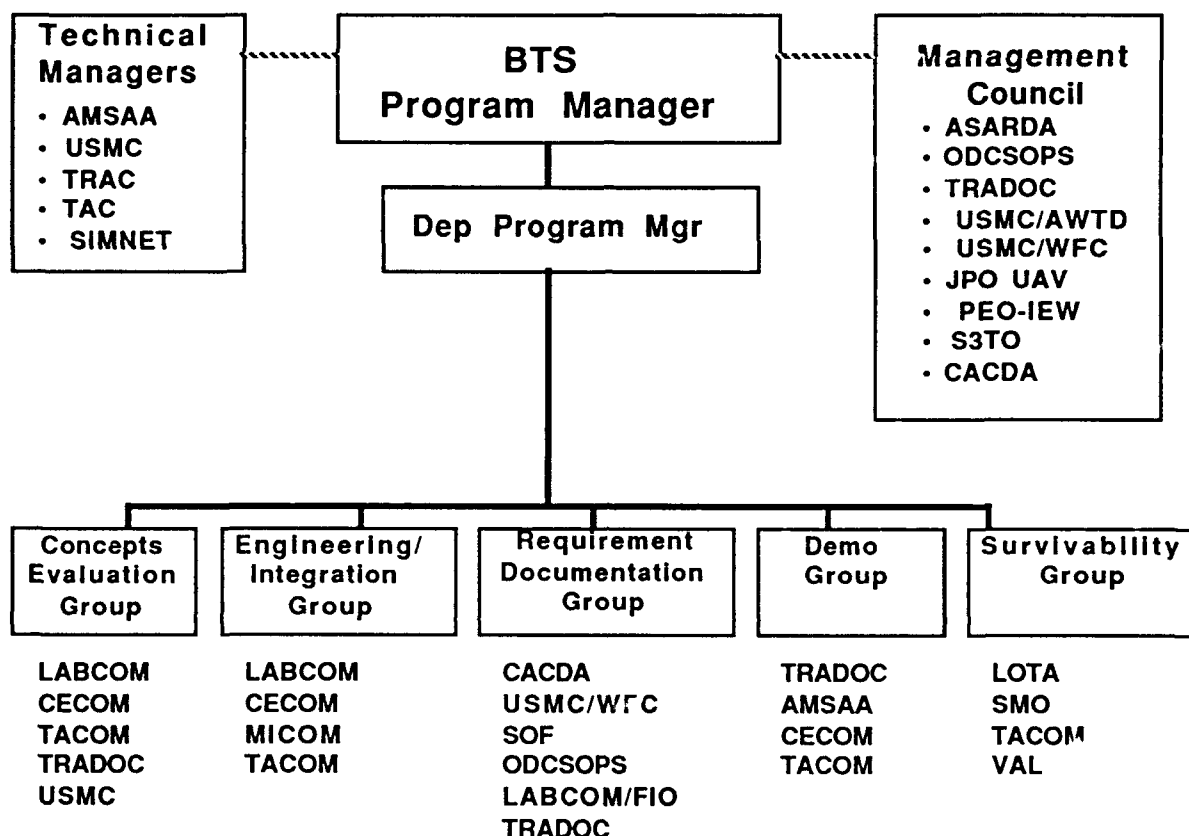## Directly Involved In BTS Program

CONGRESS

Congressional Staff

OSD

Director, BTI

HQDA

HQ,NAVY

ASARDA

ODCSOPS

PEO-REV

JPMO-UAV

Marine Corps

AWTD

WFC

HQ,TRADOC

HQ,AMC

AMSAA

CAC/CACDA

Subcommands

Schools

CECOM

MICOM

HQ,LABCOM

ASCO-BTS

INTELL

ARTY

TACOM

HDL

S3TO

Key: Organizations Involved In Executing BTS Program

Organizations Represented on Management Council

31

Figure 9 below presents the government organizations assembled for actual execution of the BTS program under the leadership of the ASCO BTS program manager.

Figure 9. Battalion Targeting System Organization

Technical Managers		BTS Program Manager		Management Council
• AMSAA • USMC • TRAC • TAC • SIMNET				• ASARDA • ODCSOPS • TRADOC • USMC/AWTD • USMC/WFC • JPO UAV • PEO-IEW • S3TO • CACDA

Dep Program Mgr

Concepts Evaluation Group	Engineering/ Integration Group	Requirement Documentation Group	Demo Group	Survivability Group
LABCOM CECOM TACOM TRADOC USMC	LABCOM CECOM MICOM TACOM	CACDA USMC/WFC SOF ODCSOPS LABCOM/FIO TRADOC	TRADOC AMSAA CECOM TACOM	LOTA SMO TACOM VAL

Based upon available information it appears that successful completion of the BTS program is not a "deliverable" of the Army Materiel Command or of LABCOM. As that is neither the CG,AMC, the DCGRDA, nor the CG, LABCOM (all of whom are in the chain of command of the ASCO) has the BTS program as one of his "deliverables" to their superiors.

Analysis of Figures 8 and 9 indicates that there are several organizations that have mixed roles in the BTS program. On one hand they serve on the Management Council and on the other hand they are supposed to take management and technical direction from the ASCO. Further, it is to be noted that two of the supporting commands -- CECOM and MICOM -- are serving in roles which could be considered to be consistent with their particular command missions. Given the nature of the BTS program, one could have expected that either MICOM or CECOM would have the lead in managing the BTS program. If the challenge in the BTS program is considered to

32

be an "aerial vehicle" problem, then MICOM should have been chosen the lead command in the BTS effort. If BTS were seen as a data processing, communications and/or sensor challenge, then CECOM should have been the lead command in executing the BTS effort. Given that the BTS program is supposed to result in a technical data package, having a level of detail and maturity to describe a system ready for limited production, one could conclude that the LABCOM-ASCO is the wrong organization for managing the BTS program since LABCOM is a technology organization whereas MICOM and CECOM are research, development and engineering centers organized and staffed to support 6.4 developments.

33

5. Areas of Concern in the BTS Program

As constituted, the BTS program seems to be an effort that is "over constrained" in the mathematical sense. That is, the number of constraints imposed on the program and program manager doesn't allow much room for management discretion or initiative. These "constraints" which define a very narrow "region" of success for the BTS program are not technical but programmatic, financial and political:

• There exists two AMC subcommands which could claim that the BTS program should more appropriately executed by them. Such a claim might not be made for rightly but could cloud and dilute their contribution to the BTS effort (whether paid for by BTS program dollars or whether these commands are to take their contribution "out-of-hide".)

• There are no senior members of AMC or LABCOM on the Management Council, although there are seats for PMs and PEOs whose authority and leverage come from charters provided at the highest levels of DA or DOD.
TRADOC and the Marine Corps have two seats on the Management Council while again there are no AMC or LABCOM level representatives.

• The BTS program is expected to result in products (demonstration and tech package) for which a PM ordinarily would be given considerable time and money to accomplish. The available BTS program finance figures indicate that a successful demonstration and data package is to be delivered in four years for less than $70 Million. The ability to accomplish this would even be a challenge for a chartered program manager (who has unique authority to cut across chains of command and to some extent work around troublesome government agencies).

• The BTS program appears to be evolving in order to satisfy as many people as possible -- Congressional staffers, BTS program director, various constituencies in TRADOC and the Marine Corps, and perhaps labs and subcommands. When a program is "quilted" to cover everybody's interests the program gets bogged down in numerous management reviews, "what if" drills and compromises. None of the constituencies are ever completely satisfied and thus give only lukewarm support for the program. This, in turn, leads to the need for more time and dollars to effect compromises and repeated justifications. (It is better to have a few highly satisfied "customers" than a legion of half happy customers.)

• Although the BTS program identifies "transitional tasks" for 1994, there is no indication that there is a program in the POM to be the recipient of the BTS results. If it is anticipated that JPO UAV will receive the results, then there must be a program "window" and process to accomplish the transition. Given the size of the BTS UAV it would seem that the BTS program would logically feed the UAV-CR system development. But by 1994 it is likely that the UAV-CR program already will have a chosen technological path and incumbent contractors. It will be difficult to insert BTS program results in a JPO UAV program. Further, as a PM, the JPO UAV should not

have the BTS along a critical path of his program unless he controls BTS.

• The BTS program could be seen by the JPO UAV as a competing program and as such could use the Management Council as a means to stifle the BTS effort. Further the JPO UAV also has been mandated by the Congress and since the JPO UAV programs entail more money and contractors these programs will likely have more political influence in OSD and the Congress.

• It is not clear with what warfighting doctrine the BTS is supposed to be compatible. Documentation refers to the Airland Battle-Future concept (not yet the basis of the Army Battlefield Deficiency Plan) as well as having the DCSOPS and USMC advising on "all matters concerning <u>current</u> operational doctrine." The doctrinal basis of the BTS system concept design as well as demonstration planning should be made explicit and as firm as possible to reduce the number of iterations of system and test designs.

• The current BTS organization seems to rely very heavily on government agencies to provide technical support to BTS. In some cases it appears this support is not funded by BTS, but is to be provided using agency mission funds.

• The available task schedule does not identify any demonstration design activity now or in the future. The demonstration should be scoped and designed starting now to determine all the interfaces -- technical, programmatic, and organizational -- that must be resolved in time to effect modeling and simulations, down selection of configurations, test site requirements, test targets, troop involvement, etc. There needs to be "backward" planning, starting with identification of what data is to be obtained and how that data will be used after the demonstration. The demonstration should be designed to collect the required data, and all hardware and software must be tailored to the data requirements. Further, the demonstration design should be one of the design cases for the simulation efforts.

• Procurement support to the BTS program manager is being provided by an organization which has other priorities and a heavy workload. The LABCOM/HDL procurement activity is in direct support of agencies providing materiel for currently deployed Army forces. Further the LABCOM/HDL procurement activity reports to a commander who does not have the BTS program as a principal deliverable to higher commanders. With these two factors, it can be anticipated that the BTS program will have difficulty in obtaining procurement support in time to meet the tight BTS program schedule.

6. Recommendations and Conclusion

The following recommendations are based upon the lessons learned from the New Thrust effort and the status and organization of the BTS program as of about January, 1991. The New Thrust Initiative is, of course, a completed effort while the BTS program is dynamic and evolving in response to programmatic influences of Congress, OSD, the JPO UAV, and elements of the Army and Navy. The recommendations offered below are specific to the BTS program, but are generic enough to be applied to most technology development and demonstration efforts.

Support of the Chain of Command
Obtain representation on the Management Council from within the AMC command structure above the LABCOM ASCO. The Chief Scientist of AMC seems about the right level, although such a choice might involve internal AMC politics. The Chief Scientist's office is above CECOM, MICOM, and LABCOM and could speak with "four star" authority.

Documentation Content of Program
Reconsider the scope of the BTS program deliverables, especially the aspect of a product that is "capable of being transitioned to 6.4 (DPPO)" in 1994. The cost of producing the necessary documentation is usually quite high and time consuming. If the tech data package is to be government furnished information for a future procurement, it must be of very high quality or it will be the cause of costly litigation.

Differences between Technology and PM Programs
Develop a program rationale and strategy which articulates the differences between BTS and JPO UAV programs. Some differences could be unique management approach, unique technology, and advanced operational concepts.

Overly Complex Organization
Streamline the BTS program organization. The number and levels of oversight should be reduced and the control of subordinate organizations should be tightened.

Internal Management Review
Form a program "murder board" to continually assess forthcoming program difficulties. The murder board should provide candid and confidential analysis and propose alternative solutions to management problems (as opposed to engineering problems).

Early Demonstration Design
Incorporate demonstration concept development and design in the near term part of BTS program. This is needed to establish the rationale for the intermediate functions as well as the articulation of the objectives of the program and highlight the differences between the BTS program and other programs.

Program Resources and Control

Scope the BTS program to minimize dependence on assets or personnel "funded out-of-hide" by other agencies. No critical path elements of the BTS program should be funded by a non-BTS program.

Conclusion

The principles and recommendations noted above are not unique or new. In a sense, they are the same principles of military operations and business management which are usually applied to full scale development programs. However these principles and recommendations are often either overlooked or inadequately implemented in technology base demonstration programs. These demonstration programs are particularly susceptible to the weaknesses of inadequate or inconsistent command support, insufficient funding for the tasks undertaken, and the need to satisfy too many clients. There is a need to provide technology base demonstration programs and their managers the same kind of authorities and administrative support accorded full scale development programs, if the advanced technology demonstration goals of the Congress and OSD are to be achieved.

Appendix A

Acronyms

ADEA	Advanced Development and Employment Activity
ADPA	American Defense Preparedness Association
ALBE	Airland Battle Environment
AMC	Army Materiel Command
AMCLD	Directorate for Technology Planning and Management, HQAMC
AMSAA	Army Materiel Systems Analysis Agency
ARI	Army Research Institute for the Behavioral & Social Sciences
ARSTAFF	Army Staff
ASAS	All Source Analysis System
ASB	Army Science Board
ASCO	Advanced Systems Concepts Office
ASARDA	Assistant Secretary of the Army for Research, Development and Acquisition
ATTD	Advanced Technology Transition Demonstration
BTI	Balanced Technology Initiative
BTS	Battalion Targeting System
CAA	Concepts Analysis Agency
CAC	Combined Army Center
CACDA	Combined Army Combat Development Activity
CECOM	U. S. Army Communications Electronic Command
CG	Commander General
COE	Corps of Engineers
CSA	Chief of Staff of the Army
DA	Department of Army
DARCOM	Development and Readiness Command
DARPA	Defense Advanced Research Projects Agency

DC³I	Distributed Command, Control, Communications, and Intelligence
DCS	Deputy Chief of Staff
DCSCD	Deputy Chief of Staff Combat Development, TRADOC
DCGRDA	Deputy Commanding General, Research, Development and Acquisition, AMC
DCSRDA	Deputy Chief of Staff; Research, Development and Acquisition, HQDA
DCSOPS	Deputy Chief of Staff, Personnel, HQDA
DEM/VAL	Demonstration/Validation
DOD	Department of Defense
DWG	Demonstration Working Group
FORSCOM	U.S. Army Forces Command
FSED	Full-Scale Engineering Development
HQ,DA	Headquarters, Department of Army
HTLD	High Technology Light Division
9th ID	9th Infantry Division
IEW	Intelligence and Electronic Warfare
JPL	Jet Propulsion Laboratory
JPMUAV	Joint Program Manager Unmanned Aerial Vehicle
JPOUAV	Joint Program Office Unmanned Aerial Vehicle
JTFPO	Joint Tactical Fusion Program Office
LABCOM	U.S. Army Laboratory Command
MICOM	U.S. Army Missile Command
MSC	Major Subordinate Command; Multi Subscriber Communications
OCE	Office, Chief of Engineers
ODCSOPS	Office, Deputy Chief of Staff Operations
ODCSPER	Office, Deputy Chief of Staff, Personnel
ODCSRDA	Office, Deputy Chief of Staff Research, Development and Acquisition
OSA	Office, Secretary of the Army

OSD	Office, Secretary of Defense
OTSG	Office of the Surgeon General
PEO	Program Executive Officer
PM	Program Manager
POM	Program Objective Memorandum
PPBES	Planning, Programming, Budgeting and Execution System
R&D	Research and Development
RDA	Research, Development and Acquisition
RDTE	Research, Development, Test and Evaluation
SCM	Self Contained Munitions
SMI	Soldier Machine Interface
TACOM	U.S. Army Tank and Automotive Command
TOA	Total Obligation Authority
TIARA	Tactical Intelligence and Related Activities
TRADOC	Training and Doctrine Command
TRASANA	TRADOC Systems Analysis Agency
UAV	Unmanned Aerial Vehicle
USMC	United States Marine Corps
VCS	Vice Chief of Staff
VISTA	Very Intelligent Surveillance and Target Acquisition

Appendix B

Copy of Briefing Given

to

Commanding General, AMC (DARCOM)

and

Commanding General, TRADOC

October 1983

NEW ⬛ THRUSTS

ARMY
TECHNOLOGY

*NEW
THRUSTS*
ARMY
TECHNOLOGY
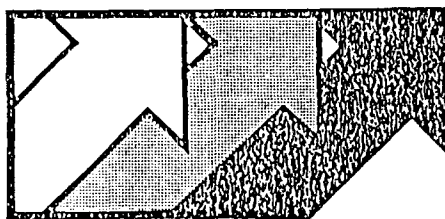
CONTENTS

- NEW THRUST INITIATIVE

- NEW THRUST
  DEMONSTRATION PROCESS

- 1986/87 DEMONSTRATION
  PROPOSAL

- DECISIONS NEEDED

NEW THRUST INITIATIVE

BACKGROUND

- 1981 ASB Summer Study
  - Concluded Army must
    -- capitalize on US technology advantages and industrial base
    -- use technology for force multipliers
    -- look at combat force as a total system
  - Recommended 23 initiatives

- Department of Army Actions
  - Selected five initiatives as thrusts with high leverage to satisfy requirements for AirLand Battle evolution
  - Included thrusts in DA Long Range RDA Plan
  - Directed development of implementation plans

PURPOSE OF NEW THRUST

Take advantage of U.S. technology edge to resolve major force deficiencies and provide the army effective force multipliers to support the AirLand and AirLand 2000 battlefield requirements in a timely manner

NEW
THRUSTS

NEW THRUSTS IN TECHNOLOGY

VISTA
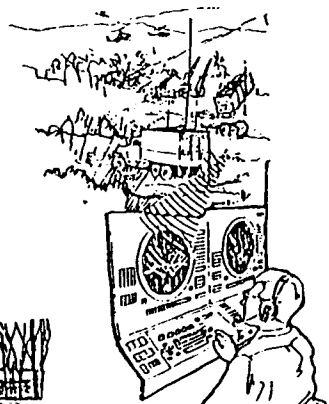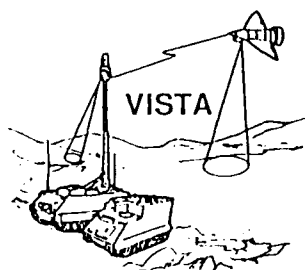
SELF-CONTAINED MUNITIONS

DISTRIBUTED C³I
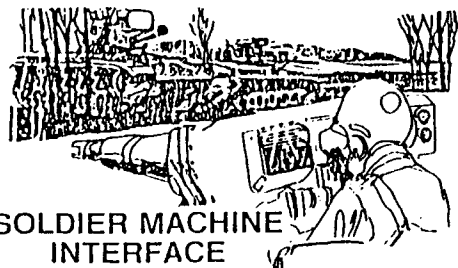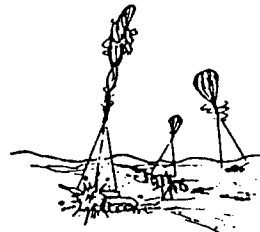
SOLDIER MACHINE INTERFACE

BIOTECHNOLOGY

VGT #7L 9/83
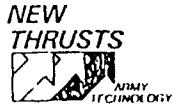
NEW WAY OF DOING
TECH BASE BUSINESS

- Focuses tech base toward defined objectives

- Implements "evolutionary acquisition"

- Provides structure for technology exploitation

- Engages TRADOC and FORSCOM early

- Engages industry early in system/operations concept development

- Provides experience to assess costs/benefits/ risks of new technology

NEW THRUST
DEMONSTRATION PROCESS

VGT #9R 9/83

DEFINITION OF AN
INTEGRATED DEMONSTRATION

"A combined arms exercise which evaluates the
integration of operational and organizational
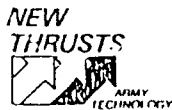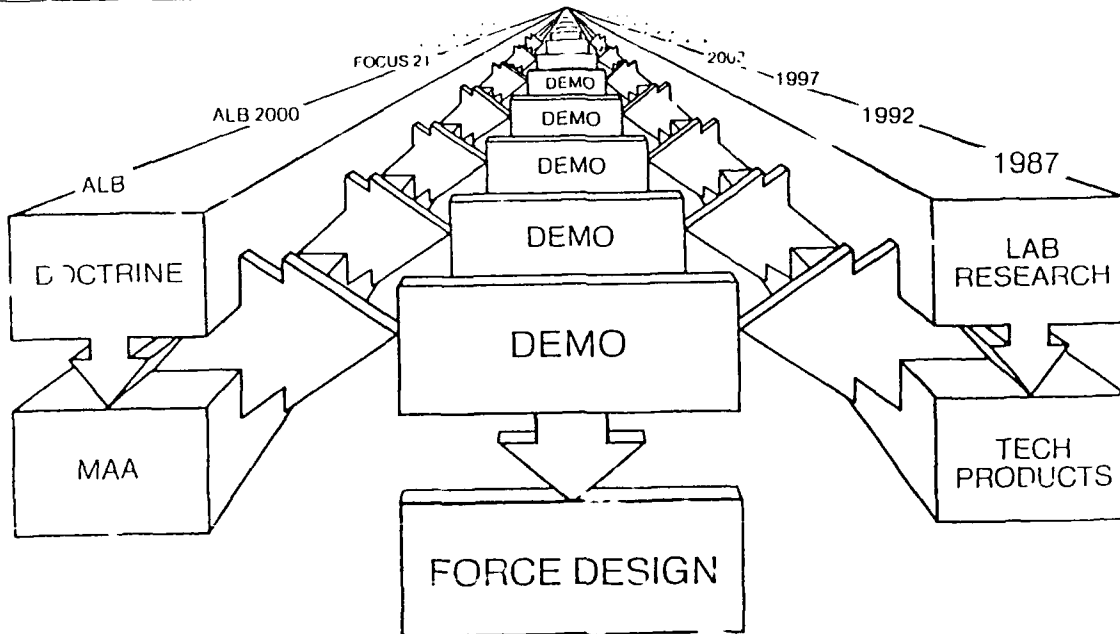concepts and their supporting technologies"

VGT #10L 9/83

WHY A DEMONSTRATION?

An integrated demonstration is the most realistic method
for evaluating –

- the early integration of technology products
  operating as a total system

- evolving operational concepts with the technology
  products necessary to implement them

- soldiers interfacing with new technology products
  during tactical operations

DEMONSTRATION PROCESS

FOCUS 21   2002   1997
ALB 2000   1992
ALB   1987

DEMO
DEMO
DEMO
DEMO
DEMO

DOCTRINE   LAB RESEARCH

MAA   TECH PRODUCTS

FORCE DESIGN
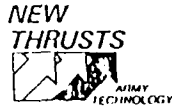
DEMONSTRATION PRODUCTS

Decision data on ALB operational concepts and thrust technologies which will

- Identify:
  - MAA deficiencies
  - technology gaps
  - promising systems for accelerated development
  - systems to be terminated

- Expedite:
  - O & O plans
  - materiel acquisition

- Provide:
  - system technical assessments
  - interoperability information
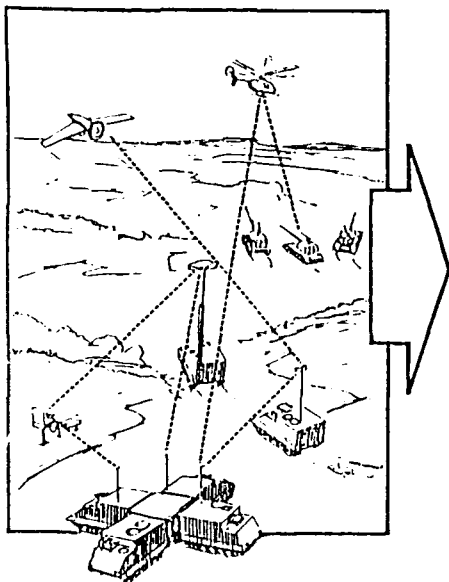
1986/87 DEMONSTRATION
PROPOSAL

DEMONSTRATION DESIGN PROCESS

VGT #18L 9/83
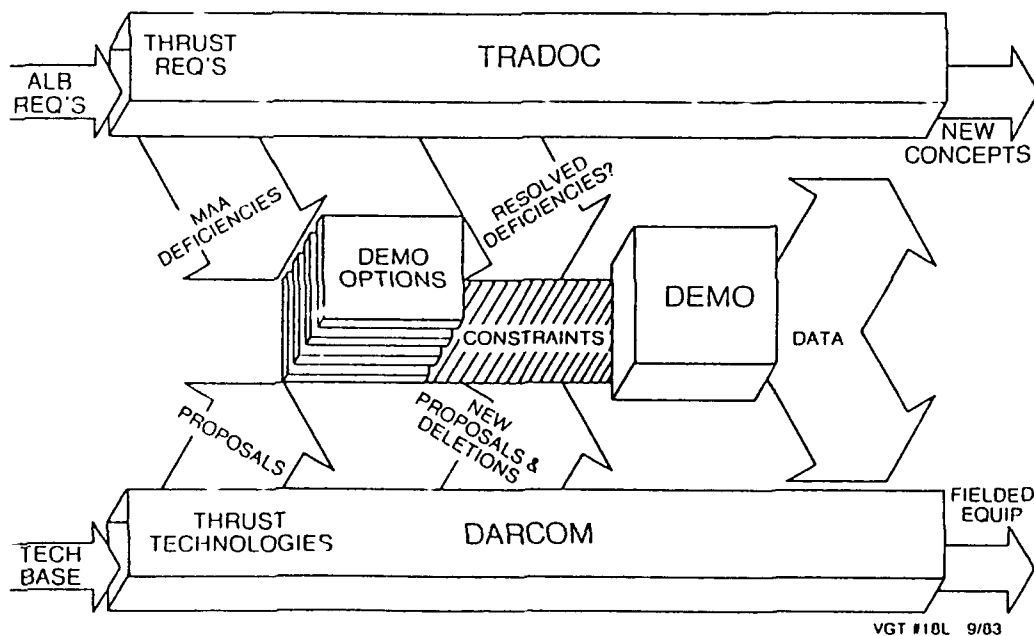
VISTA
VERY INTELLIGENT SURVEILLANCE
AND TGT ACQUISITION

VISTA PRODUCTS
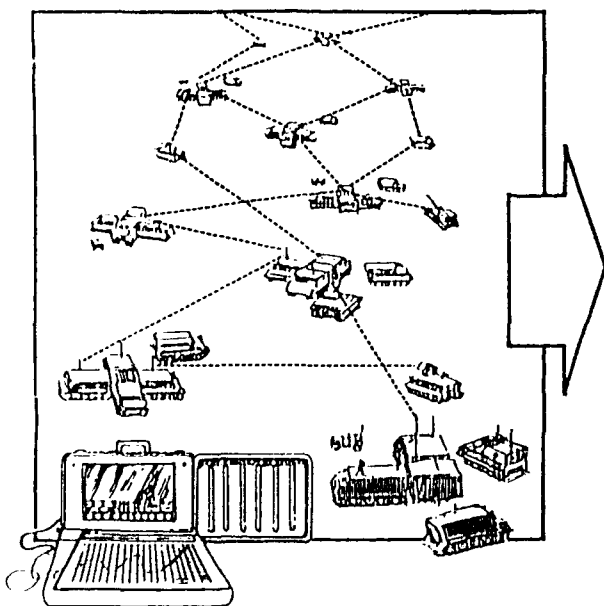
OPERATIONAL DEFICIENCIES

- Multisource Target Acquisition

- Data Reduction

- Timely Information Correlation

- Data Distribution

- Target Attack Assessment

VGT #20R 9/83

DC³I

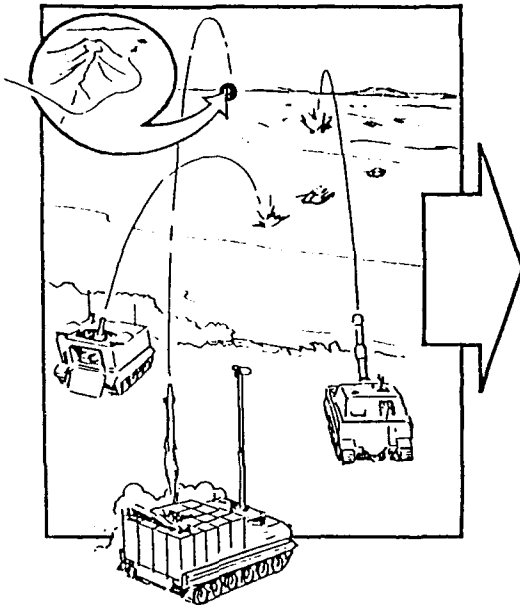### DC³I PRODUCTS

OPERATIONAL DEFICIENCIES

- C^2 Survivability

- Data Distribution/Interoperability

- Rapid Decision Making/Response

- C^2 Management Doctrine

- Continuous Operational Control in Combat

- Synchronization

VGT #19L 9/83

SCM
SELF-CONTAINED MUNITIONS

SCM PRODUCTS
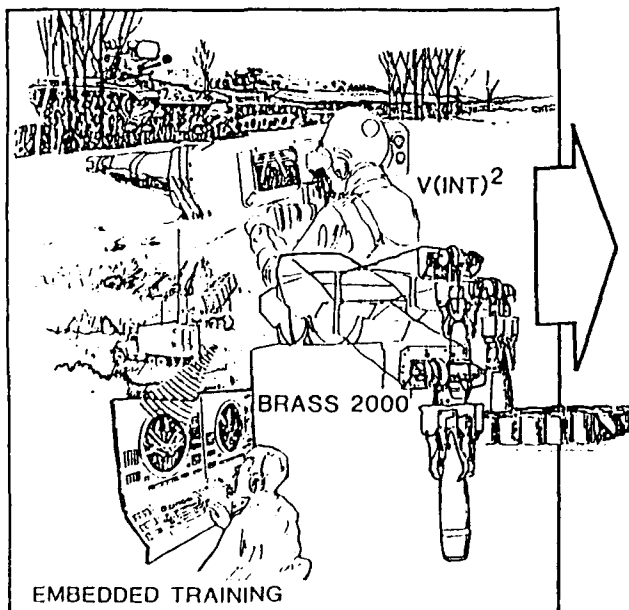

OPERATIONAL DEFICIENCIES

- Deep engagement

- Multiple Target Engagement

- Responsiveness

- Terminal Effects

- Systems Supportability

VGT #21L   9/83

SMI
SOLDIER-MACHINE INTERFACE

SMI PRODUCTS

$V(INT)^2$

BRASS 2000

EMBEDDED TRAINING

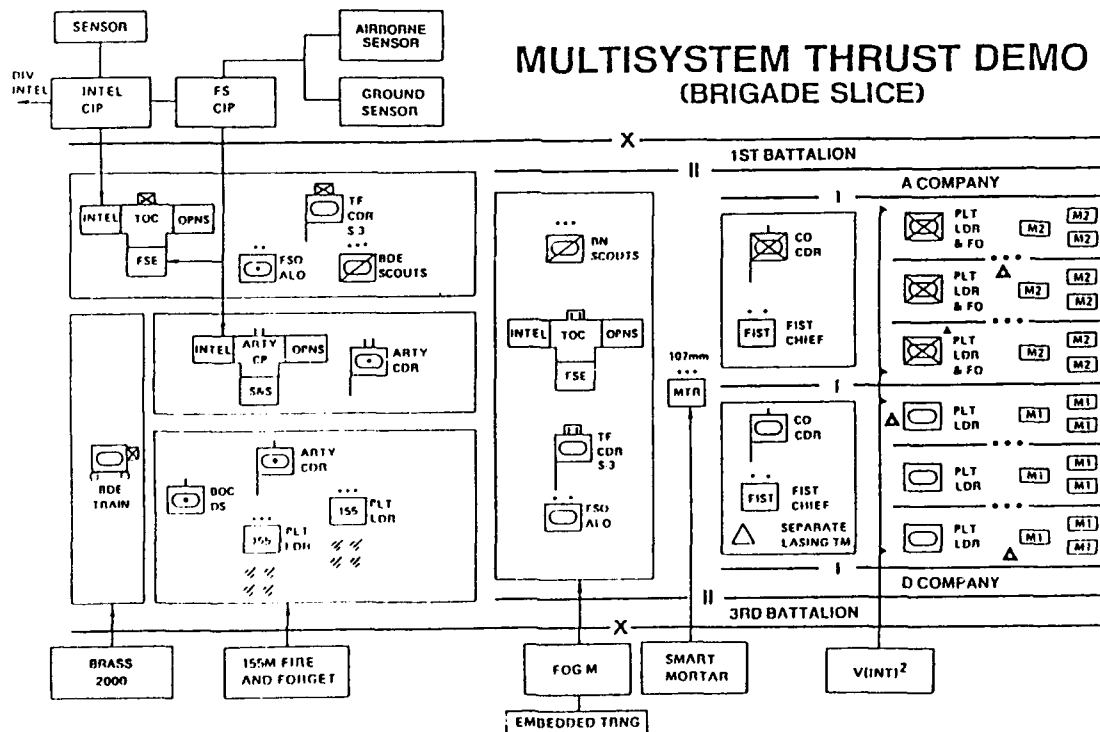### OPERATIONAL DEFICIENCIES

- Transparent Technology

- Labor Intensive Support Functions

- Automatic Systems Sensing

- Supportability

- Training on Operational Systems

VGT #22R   9/83

MULTISYSTEM THRUST DEMO
(BRIGADE SLICE)

INTEL CIP

BN TASK FORCE CP

BDE CP

DS ARTY BN

FS CIP

DIVISION REAR CP

DIVISION TAC CP

DIVISION MAIN

MULTISYSTEM THRUST DEMO
(BRIGADE SLICE)

SENSOR

DIV INTEL

INTEL CIP

FS CIP

AIRBORNE SENSOR

GROUND SENSOR

X — 1ST BATTALION

II

A COMPANY

INTEL | TOC | OPNS

FSE

TF CDR S3

FSO ALO

BDE SCOUTS

BN SCOUTS

INTEL | TOC | OPNS

FSE

CO CDR

FIST | FIST CHIEF

PLT LDR & FO — M2 M2

PLT LDR & FO — M2 M2

PLT LDR & FO — M2 M2

INTEL | ARTY CP | OPNS

SKS

ARTY CDR

107mm

MTR

CO CDR

FIST | FIST CHIEF

SEPARATE LASING TM

PLT LDR — M1 M1

PLT LDR — M1 M1

PLT LDR — M1 M1

TF CDR S3

FSO ALO

BDE TRAIN

DOC DS

ARTY CDR

155 PLT LDR

PLT LDR

D COMPANY

II

3RD BATTALION

X

BRASS 2000

155M FIRE AND FORGET

FOG M

SMART MORTAR

V(INT)²

EMBEDDED TRNG

PROJECTS SELECTED FOR INTEGRATED 86/87 DEMO

- VISTA – Combat Information Processors (Fire Support – INTEL)
  – Ground Based New Sensor System (ETAS)
  – NBC Sensors for Ground and Airborne Vehicles
  – Advanced RPV Sensors
  – Airborne Scouts with Sensor Processing and Target Handoff System
  – AN/TPQ-37–REMBASS–ASL Sensors–Passive Sensors– Interface and Fusion

- DC³I – Commo Networks and Gateways (Packet–PJH–Fiber Optic–MM Wave)
  – Intelligent Work Stations
  – Data Base Management

- SCM – Fog-M
  – Smart Mortar
  – Smart 155mm

- SMI – Embedded Training
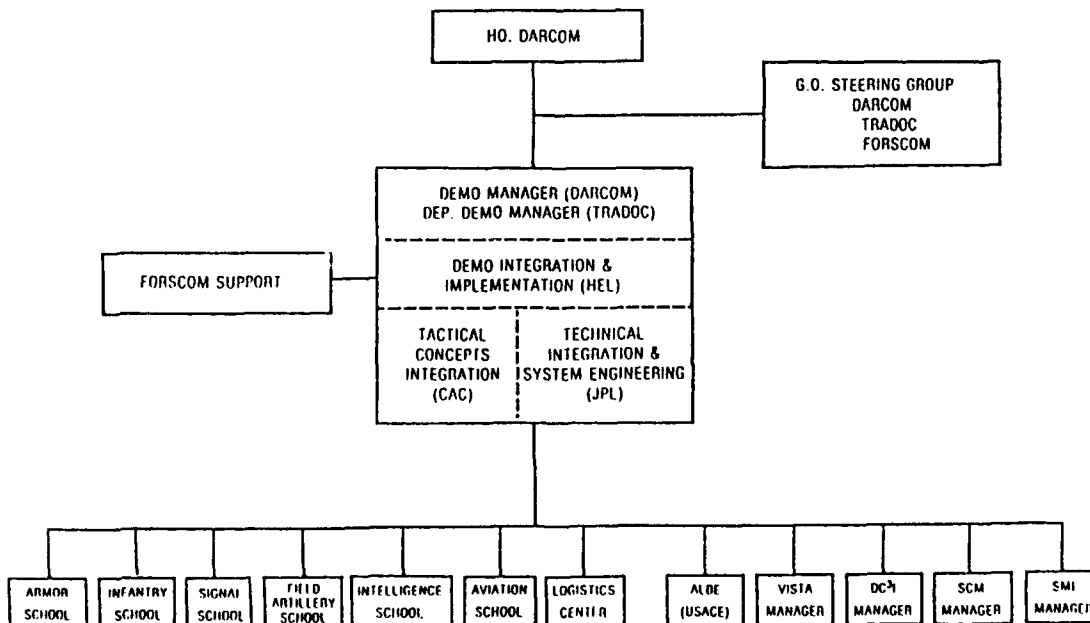 – V(INT)²
  – Brass 2000

MILESTONES
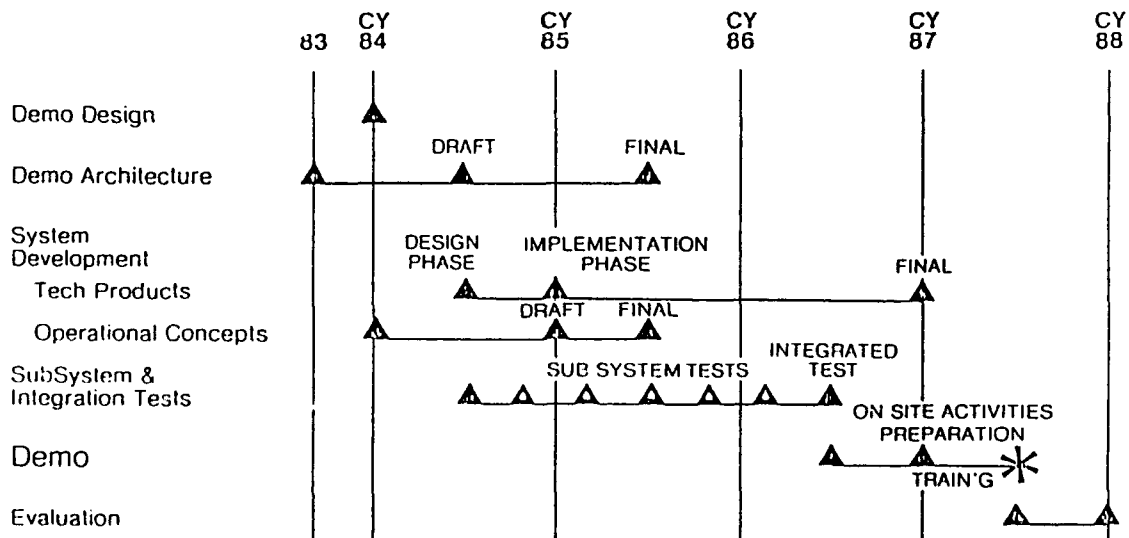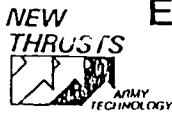
ESTIMATED RESOURCE IMPLICATIONS
(IN MILLIONS OF DOLLARS)

	FY 84		Additional thru 87	
	Demo Independent	Demo Specific	Demo Independent	Demo Specific
DARCOM	$49.2 M	$17.0 M	$165.8 M	$140.6 M
TRADOC		$2 M		$13 M

DEMONSTRATION MANAGEMENT STRUCTURE

INITIAL DEMONSTRATION MANAGER TASKS

ARMY
TECHNOLOGY

- Selection, Development and Inclusion of Demonstration Specific:
  - Technology Products
  - PM and Fielded Equipment
  - Operational & Organizational Concepts
  - Logistic Support Concepts

- Coordination with FORSCOM
  - Site Selection
  - Unit(s) Selection

- Coordination with Related On-Going Army Programs
  - Light Divisions
  - Army Development & Employment Activity (ADEA)
  - DA/DARPA DC^{3}I Test Bed
  - All Source Analysis System (ASAS) / Joint Tactical Fusion Program
  - USACE AirLand Battle Environment Program

NEW
THRUSTS **DECISIONS**

ARMY
TECHNOLOGY

- Approval of Thrust Demonstration Process

- Approval of Thrust Demonstration 86/87 Objective and Scope

- Establishment of Demonstration Manager and Management Structure

- Authorization to Coordinate with FORSCOM on Demonstration Planning and Support

- Allocation of Personnel and Financial Resources